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THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER:
ELECTRO-PLATERS REVIEW.
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A MONTHLY JOURNAL RELATING TO THE METAL AND PLATING TRADES

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Vol. 15. NEW YORK, SEPTEMBER, 1917. No. 9.

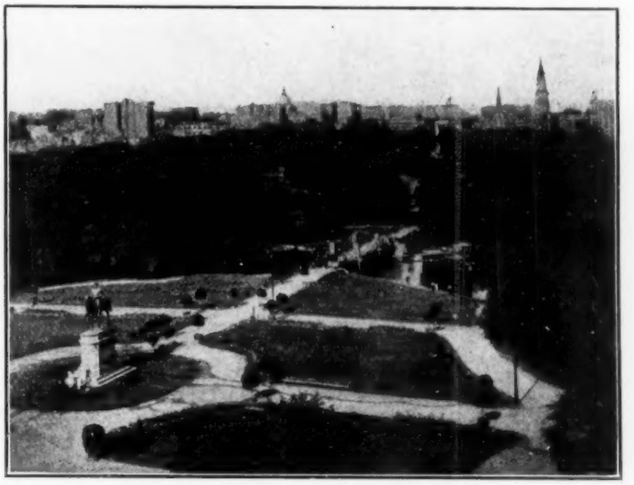
THE FOUNDRYMEN'S CONVENTION

LATEST INFORMATION REGARDING THE 1917 MEETING OF THE ALLIED FOUNDRYMEN'S ASSOCIATIONS AND THE EXHIBITION OF FOUNDRY APPARATUS AND SUPPLIES TO BE HELD IN BOSTON, MASS., SEPTEMBER 24 TO 28 INCLUSIVE.

Written for THE METAL INDUSTRY by R. T. ELMES.

The most important event in the metal industries this year is held in the east. In fact it will be "way down East" in the historic city of Boston, Mass. As has been announced in THE METAL INDUSTRY before all plans for the big undertaking have been completed, the various committees of the local foundry association has finished their work and nothing now remains but to take care of the visitors who will flock to the city during the last week of this month.

TREMONT STREET, OPPOSITE BOSTON COMMON.



BOSTON'S PUBLIC GARDEN.

VIEWS IN BOSTON, MASS., THE 1917 CONVENTION CITY.

BOSTON AS A CITY.

Boston has a population of 735,000 and is ranked fourth among cities of the United States. The real Boston, however, contains more than twice that number of people, for within a radius of twelve miles from the State House there is a population of 1,521,000. The Metropolitan District is made up of thirty-eight cities and towns, under separate governments yet sharing the benefits and expenses of parks, water supply, and sewage system.

Boston was founded in 1630 and incorporated as a city in 1822. It was originally an irregular peninsula extending into the basin and connected with the mainland by a neck so narrow that there was barely room for a road over it, and so low that water often covered it at high tide. It was gradually extended, and the filled-in land now has an acreage greater than that of the original part. This made land includes the entire Back Bay region and much of the lower part of the city; for the tide once flowed nearly up to Devonshire St. north through Dock Sq., and quite to Park Sq. along Charles St.

The crooked streets and narrow alleys of the old part of Boston are a subject for jest to the stranger, but the true Bostonian loves the irregular lines and the many short cuts.

THE PORT OF BOSTON.

In common with all other seaports, Boston has "one of the best and most beautiful harbors on the coast." Boston is also doing business. It is the second largest port in North and South America—and this by a wide margin. There are only five larger in the world—London, Liverpool, New York, Antwerp, and Hamburg, in the order named. Boston is just getting started on a new expansion. In the past two years the shipping of the port has increased from 14,700,000 tons to 15,500,000 tons; the foreign commerce of the port has increased from about $220,000,000, to $260,000,000; the trans-Atlantic passenger service has gained 40,000, and now numbers 135,000. The largest boats built can be easily accommodated at the new piers. In a short time the largest dry dock on the Atlantic coast will be built, at a cost of $3,-

000,000. The "Sail from Boston" motto of the Directors of the Port is becoming popular. Boston is 200 miles, a day's sail, nearer Europe than is New York; for persons coming from the West it means only about three hours more travel by rail to reach Boston than New York, and this three hours brings them twenty-four hours nearer Europe. Boston is now able to offer excellent accommodations in the way of first-class boats and easy access to them. Thirty-two foreign lines of steamships are now running into Boston.

BOSTON'S HOTELS.

As an evidence of Boston's ability to take care of visitors in convention it is only necessary to include a list of her most important hotels as follows:

Adams, 553 Washington St.
American, 56 Hanover St.
Beacon Chambers (men), 19 Myrtle St.

TEMPLE PLACE, BOSTON, MASS.

Bellevue, 21 Beacon St.
Brunswick, Boylston & Clarendon Sts.
Buckminster, 645 Beacon St.
Commonwealth, Bowdoin St.
Copley-Plaza, Copley Sq.
Copley Square, 49 Huntington Ave.
Crawford, Scollay Sq.
Essex, 695 Atlantic Ave.
Franklin Square (women), E. Newton St.
Lenox, Boylston & Exeter Sts.
Nottingham, 25 Huntington Ave.
Oxford, 40 Huntington Ave.
Parker House, Tremont & School Sts.
Puritan, 390 Commonwealth Ave.
Quincy, 47 Brattle St.
Somerset, Commonwealth Ave. & Charlesgate.
Thorndike, 234 Boylston St.
Touraine, Tremont & Boylston Sts.
United States, 90 Beach St.
Vendome, Commonwealth Ave. & Dartmouth St.
Victoria, Dartmouth & Newbury Sts.
Westminister, Copley Sq.
Young's, Court St.

BOSTON'S FOUNDRIES AND METAL SHOPS.

Statistics on foundry and machine shop products for Boston and the metropolitan district show that these industries hold an important position in the manufacturing field in this territory.

There are 432 establishments with an invested capital of $36,636,893. The value of stock and materials used totals $10,906,873, while the value of products reaches $31,079,868. The amount of wages paid during the year aggregated $9,595,279, being shared by 8,363 earners. These figures are given merely as an indication of the value to the industrial world of the foundry and machine shop business and of the part Boston and district plays in it.

Among the more substantial foundries, some of which are 50 years old or more, are the following: Acme Foundry Company, Chelsea; American Brake Shoe and Foundry Company, Norwood; American Tool and Machine Company, Boston; Barbour Stockwell Company, Cambridge; Boston Foundry Company, East Boston; Crescent Park Brass Foundry, Waltham; Davis & Farnum Manufacturing Company, Waltham; Essex Brass Foundry Company, Cambridge; Everett Bronze and Aluminum Foundry, Everett; Gibby Foundry Company, East Boston; Harrison Square Foundry Company, Dorchester; Hunt-Spiller Manufacturing Corporation, South Boston; Lundin Steel Casting Company, Revere; Somerville Iron Foundry, Somerville; Waltham Foundry Company, Waltham; B. Frederick Witherly, Charlestown; Woburn Iron Foundry Company, Woburn; E. J. Woodison Company, South Boston.

One of the oldest foundries in Boston is the American Tool and Machine Company, whose plant, employing 400 workmen of high-skilled ability, is located at Hyde Park. The cut herewith gives an idea of the size of the foundry which is regarded with pride in Boston as one of the foremost and most enterprising in this part of the country. It was founded in 1864 by George H. Fox and Company, at 84 Kingston street, Boston, but in a few years outgrew its original dimensions and output, necessitatiing the acquisition of much larger premises at Hyde Park, a few miles from the centre of Boston but actually within the city's boundaries. The company, of which W. M. Bacon is president, manufactures shafting, pulleys, hangers, friction clutches, general machinery and mill work, iron, brass and lead castings. It specializes, however, in western centrifugals, hydro-extractors, brass-finishers' lathes, belt knife splitting machines, improved Worrall friction clutch couplings and pulleys, improved belt tighteners, cement churns, coating machines and doublers, centrifugal oil separators, combined oil separating and waste washing machines. The general manager and treasurer is H. W. Woodworth, to whose business and executive ability the company owes much of its progress and enviable success. He is ably assisted by a corps of assistants and clerical workers, located in one of the lead-

ing and most modern office buildings, namely, 10 High street.

East Boston boasts with justification of its many manufacturing plants. In the first rank is the Gibby Foundry Company, which has an extensive factory at 96 Condor street. The company was incorporated in February, 1892, and is responsible for a large share of the vast quantity of iron and brass castings supplied to New England, the high character of its products bearing a high reputation in this part of the country. The president is A. W. Gibby, the treasurer, George H. Gibby. More than 250 skilled workmen are employed regularly and contribute largely to the success of the company, whose plant occupies about 250,000 square feet. The concern also has premises in Wakefield. Mr. A. W. Gibby is a member of the National and New England Foundrymen's Associations.

THE EXHIBITION.

The list of the exhibitors which was published in THE METAL INDUSTRY for August now includes nearly 150 manufacturers and according to Manager C. E. Hoyt, they will require 45,000 square feet of floor space which is greatly in excess of that occupied last year in Cleveland, Ohio. Manager Hoyt has also issued the following announcement:

"The American Foundrymen's Association, the American Institute of Metals and the Local Committee, find it necessary on account of extensive programs to advance the opening date for the Boston Conventions from Tuesday, the 25th, to Monday the 24th, and the joint opening session of these associations will be held in Paul Revere Hall, Mechanics Building, at 3 P. M. Monday.

"It will be of interest to exhibitors to know that all activities of the A. F. A. and the headquarters of the Local Committee will be centered in Mechanics Building, and instead of having registration open on Monday at hotel headquarters as was originally planned, all registration for members and visitors will be at Mechanics Building, beginning 10 A. M. Monday, the 24th.

"In view of the above, the Exhibit Committee have decided to advance the opening hour from 9 A. M. Tuesday to 1 P. M. Monday. This will give you an opportunity to meet visitors as soon as they arrive, and feel sure that our action will meet with your approval.

"One printed anonuncement has already gone out to the effect that the exhibit would open at 10 A. M. but this will be corrected in all later announcements.

"We would appreciate it if the exhibitors located in Section "A" will make a special effort to have all exhibits in readiness by 10 A. M. when registration begins, as it will help to make a favorable impression on the early arrivals."

THE PROGRAM.

The following program has been arranged for the American Institute of Metals which will be quartered at Hotel Somerset:

MECHANICS' HALL, WHERE THE EXHIBITION OF FOUNDRY EQUIPMENT AND SUPPLIES, UNDER THE AUSPICES OF THE AMERICAN FOUNDRYMEN'S ASSOCIATION, WILL BE HELD THE WEEK OF SEPTEMBER 24, 1917.

PROGRAM AMERICAN INSTITUTE OF METALS.
MONDAY, SEPTEMER 24.

10 a. m.—Registration, Mechanics Building.

3 p. m.—Joint open session American Foundrymen's Association and American Institute of Metals, Paul Revere Hall, Mechanics Building.

TUESDAY, SEPTEMBER 25, 9:30 A. M., HOTEL SOMERSET.

Melting and Casting Nonferrous Metals.

"Raw Materials Used for Crucibles," by Prof. A. V. Bleininger, Bureau of Standards, Washington, D. C.

"Melting Yellow Brass in New Form of Induction Furnace," by G. H. Clamer, Ajax Metal Company, Philadelphia.

"Casting Bearings in Sand and Metal Molds," by R. R. Clarke, Pennsylvania Lines West of Pittsburgh, Pittsburgh.

"Negative Experiments on Waste Core Sand," by Dr. H. W. Gillett, Bureau of Mines, Ithaca, N. Y.

"The Crucible Situation," by M. McNaughton, Jos. Dixon Crucible Company, Jersey City, N. J.

"The Electric Furnace and Nonferrous Metals," by Dwight D. Miller, the Society for Electrical Development, New York City.

"My Experience with Metal Melting Furnaces," by W. H. Parry, National Meter Company, Brooklyn, N. Y.

"The Briquetting of Nonferrous Light Metal Scrap," by A. L. Stillman, General Briquetting Company, New York City.

1:30 p. m.—Boat ride in and about Boston Harbor. Luncheon will be served on board.

WEDNESDAY, SEPTEMBER 26, 9:30 A. M., HOTEL SOMERSET.

Uses of Nonferrous Metals for Munitions, Etc.

"The Present Status of Tin Fusible Plug Manufacture and Properties," by Dr. George K. Burgess, Bureau of Standards, Washington, D. C.

"Stellite," by Elwood Haynes, Haynes Stellite Works, Kokomo, Ind.

"The Use of Die Castings in Munitions," by Charles Pack, Doehler Die Castings Company, Brooklyn, N. Y.

"Shrapnel Bullets," by Harold J. Roast, The James Robertson Company, Ltd., Montreal, P. Q.

"A Few Points on Alloy Patents," by William J. Rich, Patent Office, Washington, D. C.

Address by a representative of the United States Tariff Commission.

"The Use of Bronzes in Railroad Turntables and Movable Bridges," by O. E. Selby, Big Four Railroad, Cincinnati.

"Recent Industrial Uses of Aluminum," by F. G. Shull, Aluminum Company of America, Boston.

"The Consumption of Copper and Its Varied Uses," by H. D. Hawks, United Metals Selling Company, New York City.

3 p. m.—Baseball game, Fenway Park, Boston and Cleveland, American League teams.

8:15 p. m.—Theatre party.

THURSDAY, SEPTEMBER 27, 9:30 A. M., HOTEL SOMERSET.

Testing of Nonferrous Metals.

"Comparative Tests on Test Bars and Actual Castings," by W. M. Corse, Titanium Bronze Company, Niagara Falls, N. Y.

"Analysis of Babbitts and Brasses," by E. W. Hagmaier, Buffalo.

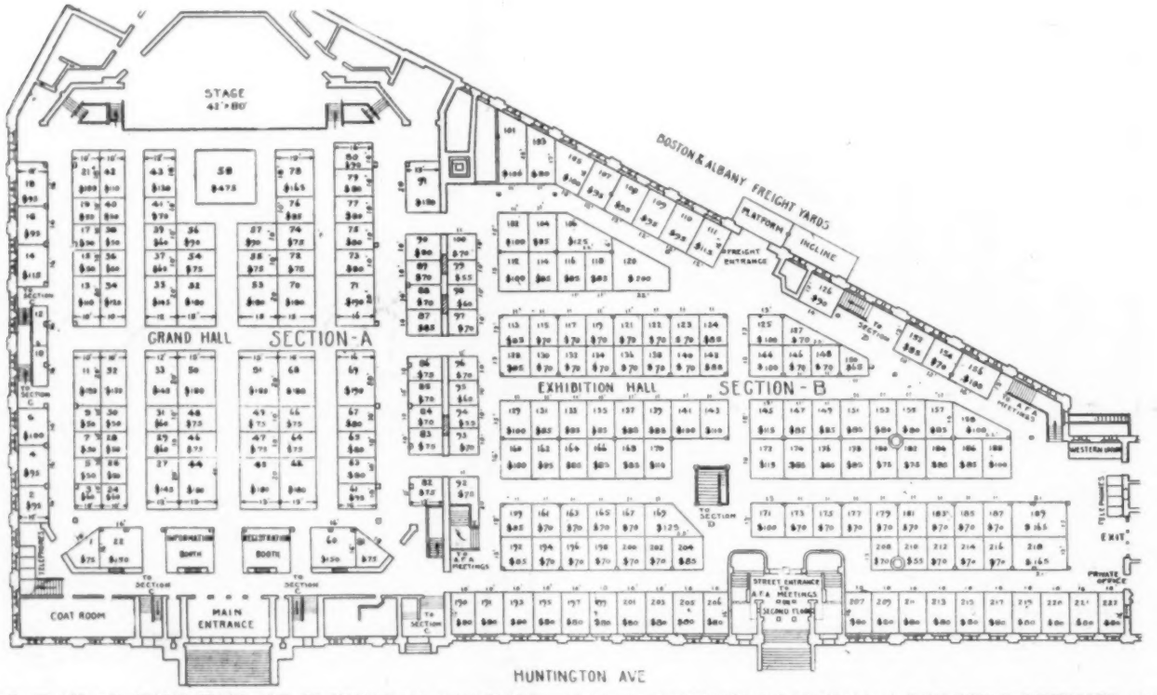
"Standard Test Bars of 88-10-2 and 88-8-4, Being the Result of Co-operative Work of Six Foundries; a New Series of Tests," by C. P. Parr, Bureau of Standards, Washington, D .C.

"The Expansion Coefficients of Alpha and Beta Brass" and "The Corrosion of Manganese Bronze Under Stress," by Dr. Paul D. Merica, Bureau of Standards, Washington, D. C.

"Corrosion of Brasses of the Muntz Metal Type," by H. S. Rawdon, Bureau of Standards, Washington, D. C.

Address by Richard C. Maclaurin, President, League to Enforce Peace.

"The School End of the Job in Training Foundrymen," by Dean C. B. Connelley, Carnegie Institute of Technology, Pittsburgh.



FLOOR PLAN OF MAIN HALL OF EXHIBITION BUILDING. HERE ARE HOUSED IN SECTION A THE STILL EXHIBITS, WHILE SECTION B CONTAINS BOTH STILL AND LIGHT OPERATING EXHIBITS. "THE METAL INDUSTRY" WILL BE FOUND IN SPACE 48, SECTION A.

"The Flux and Cleaner Question of Brass," by E. D. Frohman, S. Obermayer Company, Pittsburgh.

"Pyrometers; Their Construction and Application," by John P. Goheen, Brown Instrument Company, Philadelphia.

"Electrically-heated Core Ovens," by Dr. C. F. Hirshfeld, Edison Illuminating Company, Detroit.

"Brass Rolling Mill Alloys," by Roy A. Wood, Cheshire, Conn.

12 m.—Luncheon for the ladies, followed by an automobile sight-seeing tour.

12:30 p. m.—Visit to the West Lynn plant of the General Electric Company. Luncheon will be served at the works.

7 p. m.—Annual banquet, Copley-Plaza Hotel.

FRIDAY, SEPTEMBER 28, 9:30 A. M., HOTEL SOMERSET.

Metallurgy and Metallography.

"The Electrolytic Production of Antimony," by Prof. D. J. Demorest, Ohio State University, Columbus.

"The Electrical Properties of Some High Resistance Alloys," by Prof. M. A. Hunter, Rensselaer Polytechnic Institute, and F. M. Sebast, Troy, N. Y.

"The Amorphous Theory in Metals," by Zay Jeffries, Aluminum Castings Company, Cleveland.

"The Volatility of Zinc and Cadmium," by John Johnston and Edward Schramm, American Zinc, Lead & Smelting Company, St. Louis.

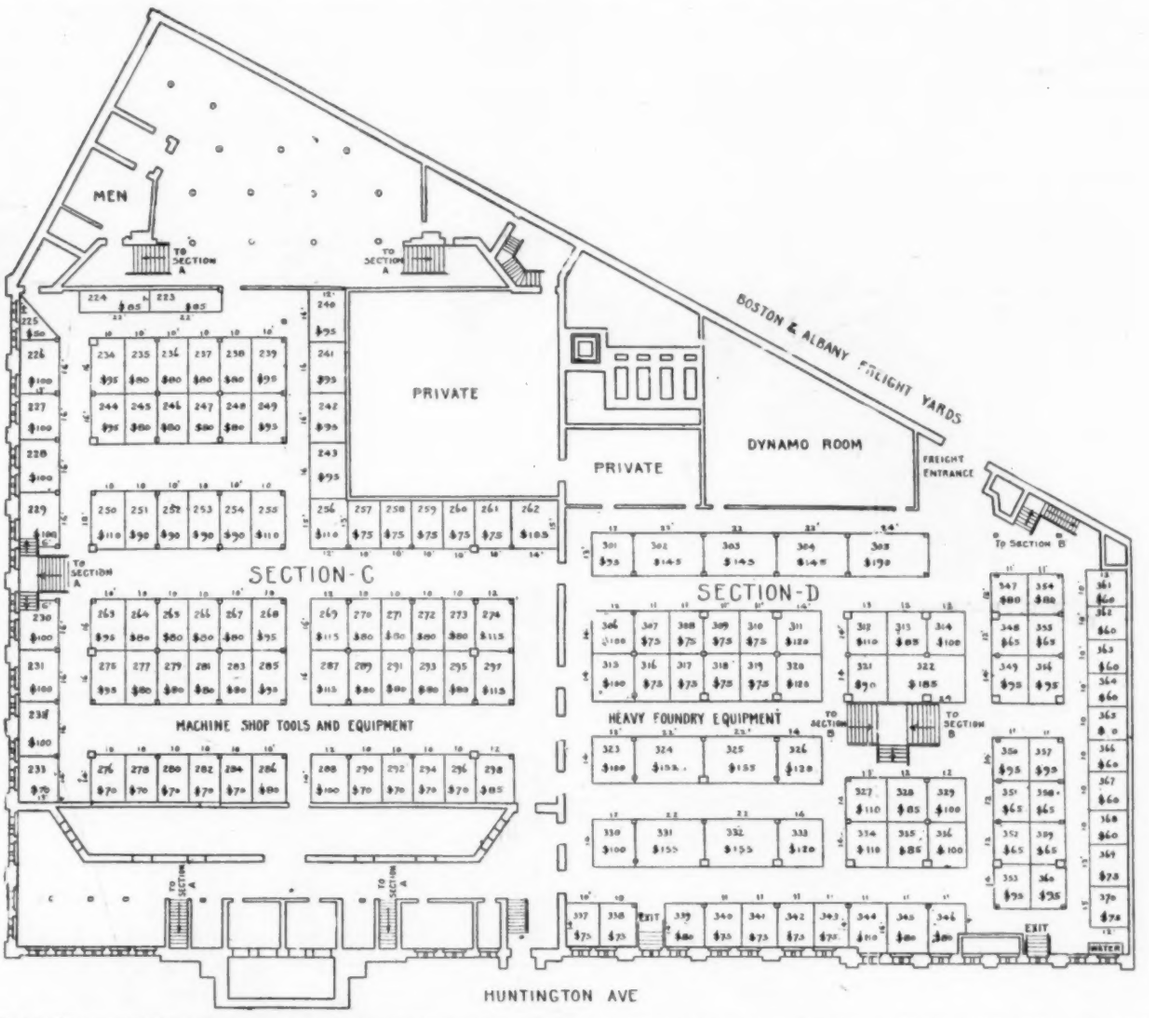
"Surface Tension and Deoxidizing of Metals," by W. J. Knox, Metals Deoxidizing & Refining Company, New York City.

"Antimony; Its Metallurgy and Uses," by K. C. Li, Wah Chang Mining & Smelting Company, Inc., New York City.

"Development and Reabsorption of the Beta Constituent in Alloys Which Are Normally of the Alpha Type," by Prof. C. H. Mathewson, department of mining and metallurgy, Yale University, and Philip Davidson, New Haven, Conn.

"The Swelling of Zinc Base Die Castings," by H. M. Williams, National Cash Register Company, Dayton, Ohio.

Plant visitation.



FLOOR PLAN OF SEMI-BASEMENT OF EXHIBITION HALL. HERE IN SECTION C AND D ARE FOUND THE HEAVY MOVING EXHIBITS OF THE FOUNDRY SHOW.

PLANT OF THE ACME FOUNDRY COMPANY, CHELSEA, MASS.

METAL MACHINE SHOP PRACTICE

SMALL TOOLS AND EQUIPMENT USED IN MACHINING BRASS CASTINGS.

Written for THE METAL INDUSTRY by P. W. Blair, Mechanical Superintendent.

In the modern and up-to-date methods of machining or finishing brass castings the lathe is only efficient when efficiently tooled. By selecting tools that are universal and permit heavy cuts the turret lathe or turret screw machine is made more effective and the mechanic's or operator's work less wearing. Many savings, more than

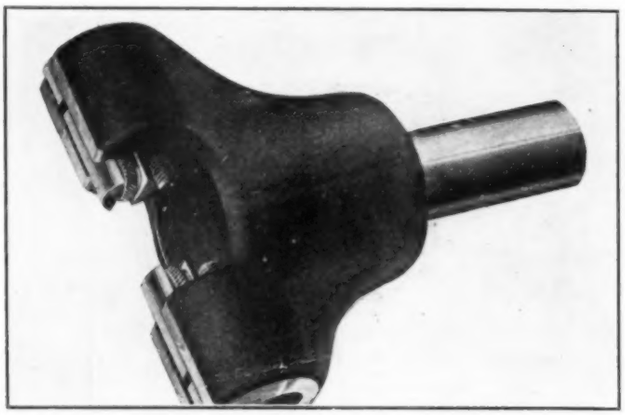


FIG. 1.—TURRET KNURLING TOOL.

half the production time in some instances, have been effected by using the correctly designed tools.

The success of the brass manufacturing business depends upon the producing power used all through the different stages or operations.

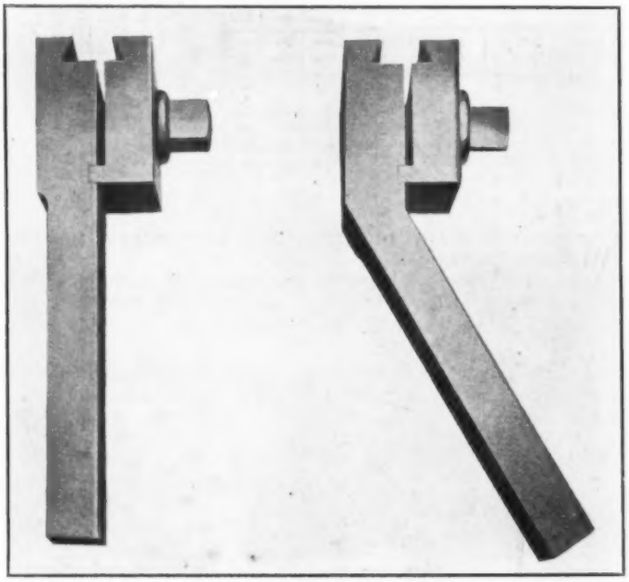


FIG. 2.—TOOL POST FORMING CUTTER HOLDER.

To increase production and develop buying power to the full of regular and prospective customers is the ultimate goal of every manufacturer.

The most important methods in machining parts and chucking same is one of the strict requirements relative to speed and economy. Fig. 1 shows a turret knurling tool. This tool is designed to hold standard straight knurls and is adjustable to hold straight spiral or diamond knurling tools. The holder is provided with a screw adjustment for various diameters within the range of the tool. The different styles and makes of self-opening die heads and collapsible taps now on the market are most frequently used in up-to-date plants and satisfactory results are derived from the use of them.

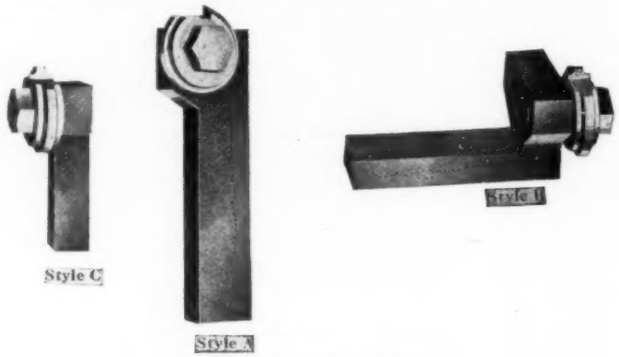


FIG. 3.—RADIUS TOOLS.

Fig. 2 shows a tool post forming cutter holder. These holders are made with the straight or bent shank for straight forming cutters and are used in the cross slide forming tool post for use on narrow cuts forming cuts.

Fig. 3 shows radius tools. These tools are used for producing round corners. The cutter is of the circular type made with a radius on both sides and can be used

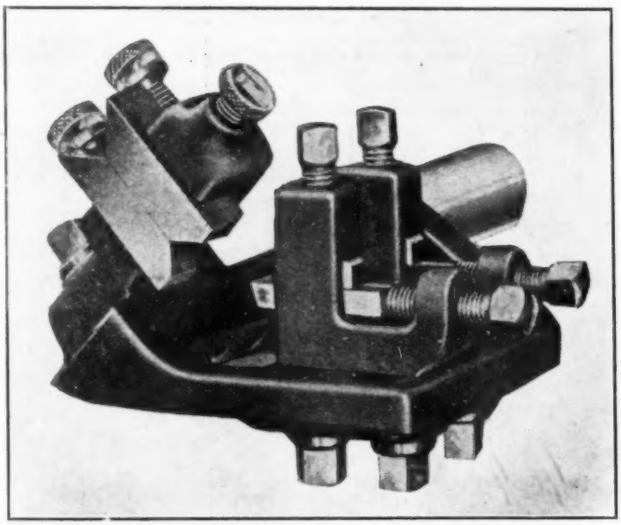


FIG. 4.—ADJUSTABLE BOX TOOL.

on either side of shank. Fig. 4 is an adjustable box tool. The tool consists of two tool posts and a back rest holder each having lateral adjustment on the body. Fig. 5 shows an overshot box tool with circular cutter attachment embodying many salient features and stand up under the maximum of cutting speeds in machining brass goods. What was formerly necessary to accomplish through skilled labor has been supplanted by the use of these box tools.

Fig. 6 shows improved releasing male and female chucks used with air. Pieces or articles ready for machining are chucked and released without stopping or re-

versing machine which is a great saving on the wear and tear or upkeep of countershafts. Fig. 7 shows carburetor brass parts, chucked and machined in a universal two

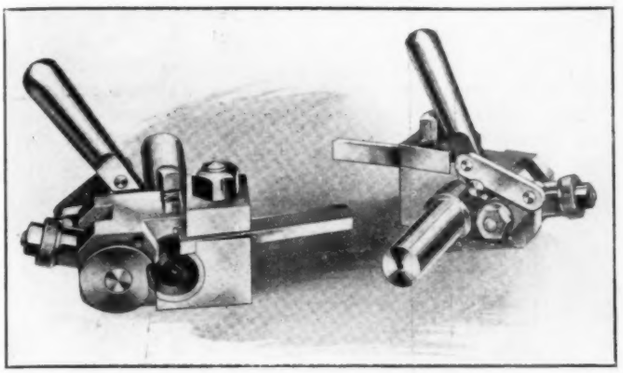


FIG. 5.—OVERSHOT BOX TOOL WITH CIRCULAR CUTTER ATTACHMENT.

jaw aero chuck and master hinge collet chuck. Fig. 8 shows a two jaw universal aero chuck with specimens of castings.

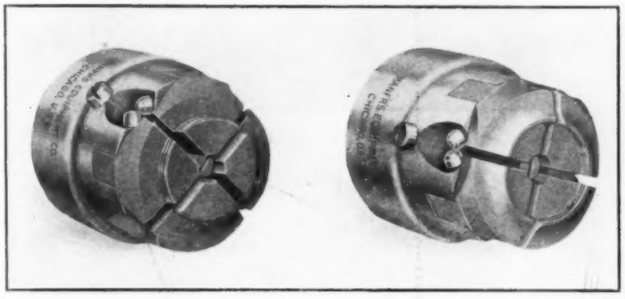


FIG. 6.—IMPROVED RELEASING MALE AND FEMALE CHUCK USED WITH AIR.

Fig. 9 shows the Ideal releasing tap and die holder. The device is a combination holder adapted for either taps or solid dies and is designed for use on either monitor

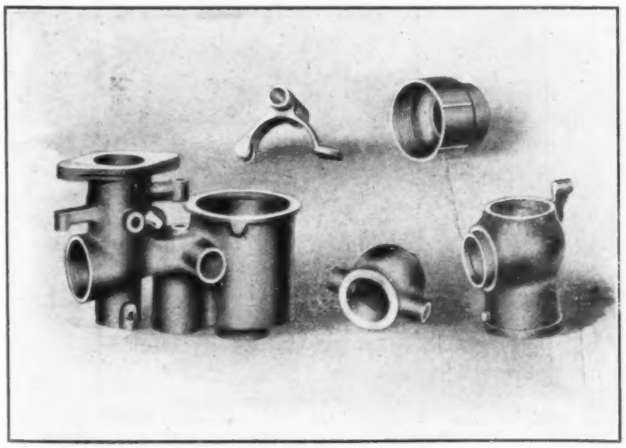


FIG. 7.—CARBURETOR BRASS PARTS, CHUCKED AND MACHINED IN A TWO JAW AERO CHUCK AND MASTER HINGE COLLET CHUCK.

turret hand or automatic screw machines. It will be noted that the mechanism is entirely enclosed, eliminating any possibility of chips or dirt getting in and interfering with its mechanism or its operation. All of the parts are hardened, giving it extremely long life. The shank is heavy, with only a small hole through it, elimin-

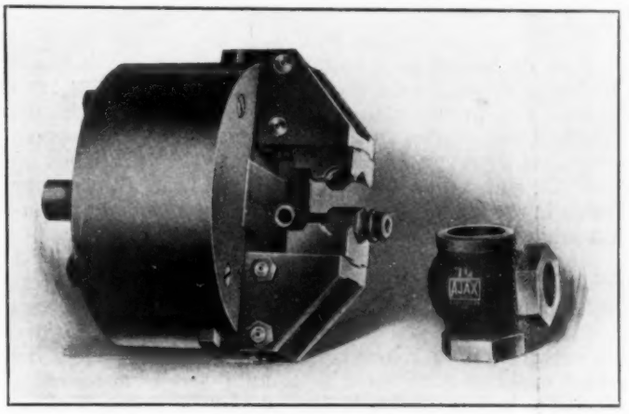


FIG. 8.—TWO JAW UNIVERSAL AERO CHUCK WITH SPECIMEN OF CASTINGS.

ating the possibility of getting out of round should the turret clamp screw be drawn down too tight. This holder can not wear so as to get out of alignment. It is made

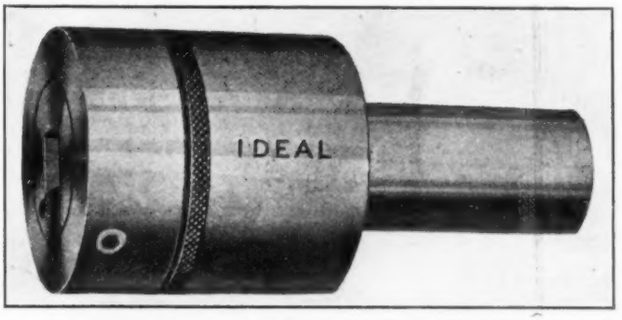


FIG. 9.—IDEAL RELEASING TAP AND DIE-HOLDER.

regularly in four sizes to take dies ranging from 5/8 to 1½ inches in diameter, also taps in same proportion. Should a left hand thread be desired instead of right

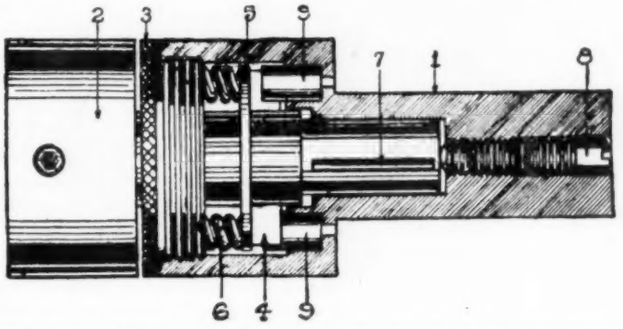


FIG. 9a.—SECTIONAL VIEW OF IDEAL RELEASING TAP AND DIE-HOLDER.

hand, this can be accomplished by taking the holder apart and removing a small roller and inserting same in the groove marked letter L.

SPELTER PRODUCTION.

The production of spelter in the first six months of 1917 was 364,000 net tons, according to returns of the United States Geological Survey.

THE BRASS CHEMIST

How His Usefulness Is Explained by the Bulletin of the Scovill Manufacturing Company, Waterbury, Conn.—Third Paper.

ZINC.

Zinc or spelter is a white metal with a slight shade of blue. When pure it shows a beautiful crystalline fracture. The presence of impurities usually renders the fracture less coarse, and less brilliant. It is about seven times as heavy as water, melts at 419° C., boils at 918° C., and can be distilled at full red heat. Zinc vapor burns in the air to form ZnO, giving out a brilliant greenish white flame.

The most important ores of zinc are Zinc Blend (ZnS) and Calomine ($ZnCO_3$), Kansas, Illinois, and New Jersey supplying the largest quantities. The ore is first concentrated and then roasted, or, else calcined in order to convert it into Zinc Oxide. The resulting finely divided material is mixed with ground coal (non-coking), heated to bright redness in retorts, and the zinc is distilled over in an atmosphere of Carbon Monoxide gas.

Zinc when cast is brittle; nevertheless, if it is heated between 100° C. and 150 C., it becomes malleable. At 210° C. it becomes brittle again and can be finely powdered in a mortar. For the best quality of brass, it is necessary that the zinc be of high grade, and should not

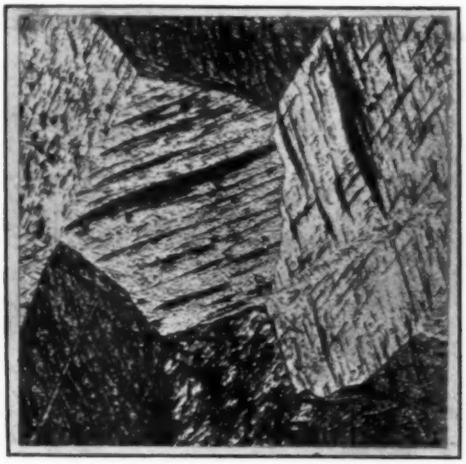


FIG. 4.—STRUCTURE OF PURE SPELTER.

contain over 0.10% impurities, such as iron, lead and cadmium, and must be free from aluminum.

Zinc is known commercially to the trade as Spelter.

The structure of pure spelter is shown in micrograph Fig. 4. You will recognize the irregular many-sided grains, such as is characteristic of all pure-cast metals. It is similar to Fig. 1 (a micrograph of pure copper) shown in our second paper. The fine parallel markings denote the cleavage planes of the various crystals.

BRASS.

Brass is an alloy of copper and zinc, and was known to the ancients. Records show that the Romans were familiar with it about the beginning of the Christian era.

The early method of manufacture was to use bean or shot copper mixed with the zinc ore (Calomine) and charcoal. The zinc was thus volatilized, in the process of melting, and reacted with the copper to form brass. Not until 1781 was brass made from the union of metallic zinc and metallic copper.

Zinc and copper unite in all proportions when molten, and the color obtained varies with the copper content.

Composition.	Color.
100-85% Copper	Copper red
85-80% "	Yellow red
80-64% "	Yellow
64-52% "	Red yellow
52- 0% "	Grey white

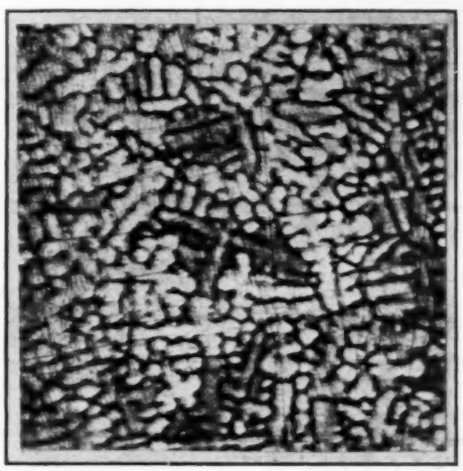


FIG. 5.—STRUCTURE OF COMMON HIGH BRASS.

Brass of commercial importance ranges from 95% to 50% copper.

Composition.	Name.
95-90% Copper	Gilding
75-67% "	Cartridge brass
66-64% "	Common high
60% "	Muntz metal
50% "	Brazing solder

Brass is usually made in the following manner:

FIG. 6.—CAST COMMON HIGH BRASS AFTER ANNEALING.

A charge varying from 90 lbs. to 250 lbs. is melted in a graphite, or clay crucible. The scrap brass is melted down first, then all the copper is put in ,and when thoroughly melted the zinc or spelter is cautiously added in as large pieces as possible. Considerable heat is produced

by the combination of the two metals, and some of the zinc burns with dazzling brilliancy with the formation of Zinc Oxide (ZnO). When the molten metal has reached the proper pouring temperature it is poured into cast-iron molds to form bars or rods. The structure of cast common high brass is illustrated in Fig. 5. The difference in appearance between cast pure metals and cast alloys is well demonstrated here. The light and dark shadings indicate that a difference in composition exists

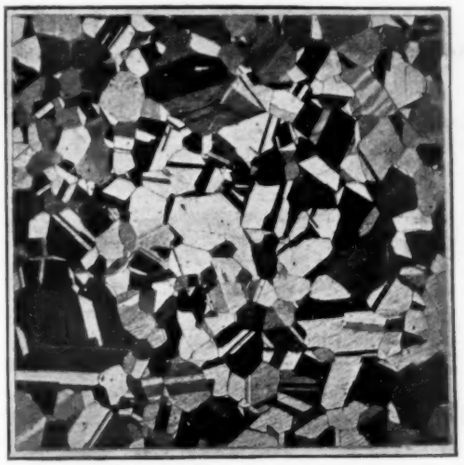


FIG. 7.—COMMON HIGH BRASS THOROUGHLY ANNEALED.

between the outside and center of each crystal. However, when cast common high brass is annealed, this difference in composition disappears and the metal is said to be homogeneous. Such a condition is illustrated in Fig. 6, which shows a micrograph of cast common high brass after annealing. The resulting structure resembles that of a pure metal.

FIG. 8.—BRASS REDUCED ABOUT 40 PER CENT. BY ROLLING.

ANNEALING OF BRASS.

Annealing is the continued heating of metal at some temperature below its melting point, with the object of releasing the hardening effects on strain, and restoring the metal to a crystalline state. The success of annealing depends upon the judgment and skill of the furnace operator, because he places the charge in the furnace, regulates the flow and composition of hot gases, and determines when the load of metal has been uniformly and thoroughly heated. The rate of heating, or the bringing of the whole mass evenly up to the proper temperature, is very important.

Metal can absorb heat at a definite rate; by firing the furnace too hard, the annealer is apt to overheat the outside of the load, while the center is comparatively cold. Unfortunately, the common practice is to raise the temperature of the furnace beyond the proper annealing heat in order to "drive" the heat into the center of the mass of metal. It is better to take the extra time to heat more slowly, as the proper temperature is neared, than

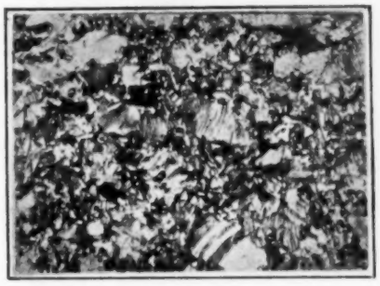


FIG. 9.—PARTIAL RECRYSTALLIZATION OF BRASS.

to take the chance of carrying the exterior of the load beyond the proper annealing temperature.

Common high and cartridge brasses which have been thoroughly annealed and slowly cooled, are usually entirely free from strains, and are completely recrystallized, having a medium crystal size. A sample of common high brass thoroughly annealed is shown in Fig. 7.

Cold working (rolling or drawing) deforms and elongates the crystals in the direction of the rolling or drawing.

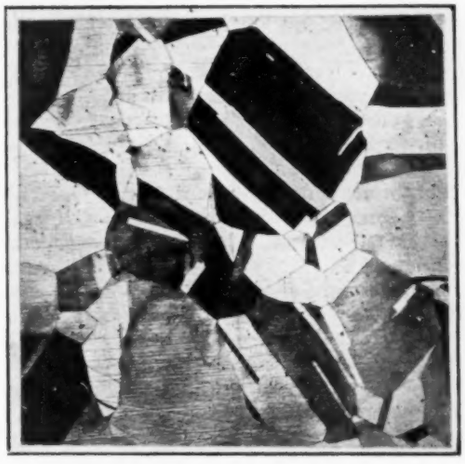


FIG. 10.—STRUCTURE OF SHELL MADE FROM OVER-ANNEALED METAL.

Brass reduced about 40% by rolling is shown in Fig. 8. The result of deformation by cold working is to increase the strength and decrease the ductility of the metal. Cold working is accompanied by a marked hardness and induced strains.

The first mechanical softening effects from annealing cannot be distinguished under the microscope. With more prolonged heating the formation of a large number of minute crystals takes place. Such a condition of partial recrystallization is shown in Fig. 9. You will note that the originally deformed grains are still present. Be-

tween the large grains we have a growth of tiny crystals; an anneal of this sort, although capable of releasing the strains in the metal, is not sufficient to completely soften it. If metal is only slightly softened by annealing, without permitting the growth of new crystals of moderate size, its powers to undergo further distortion is more limited than it would be if the brass were in a more thoroughly annealed condition; in other words, it is safer to obliterate as far as possible all the traces of the previous application of cold work before performing any more work on the metal.

Annealing at too high a temperature for a prolonged length of time tends to coarsen the crystals, which makes the metal weaker and less resistant to shock. Besides, prolonged annealing a high temperature is dangerous, because it allows the furnace gases to react with the hot metal.

The effects of over-annealing are best shown in the drawing of shells. When a shell is drawn from over-anneal metal, the bottom of the cup is rough and similar in texture to the skin of an orange. When the annealer is questioned as to the cause of rough shells, he invariably answers that the metal had been "speltered" in the annealing. The true cause can be laid to the fact that the metal had been over-annealed, which has resulted in the formation of very large crystals. Owing to the deformation caused by drawing, the metal moves along the crystal faces and within the crystals themselves. The movement of the large crystals on the furnace of the metal gives the shell the characteristic rough appearance.

Fig. 10 illustrates the structure of a shell made from over-annealed metal.

(To be continued.)

METAL MELTING AS PRACTICED AT THE ROYAL MINT, BIRMINGHAM, ENGLAND

A Paper Presented at a Recent Meeting of the Institute of Metals Held at Burlington House, London, England

By W. J. Hocking.

(Concluded from August.)

FUEL SUPPLY AND COMBUSTION.

Experience gained with the use of gas fuel in the temporary gold melting house, to which reference has already been made, pointed to the desirability of securing a liberal supply of gas at a constant pressure. The supply of gas under these conditions was undertaken by the Commercial Gas Company, and a 12-in. street main was laid to the meter-house, where four meters, each of 1,000 light capacity, were installed, one to act as a reserve. From the meter-house a 9-in. service main supplies the Melting Houses direct, and the consumption of gas in melting operations is readily ascertained.

In the large house (Fig. 2) the gas is delivered at the furnaces through a 6-in. service pipe at a steady pressure of 3 in. of water at the furnace. As the total consumption of the 16 large furnaces is about 15,000 cubic feet per hour, the provision for delivery is well in excess of the requirements. An ample reserve is considered essential to uniformity in results.

Three rotary blowers of the Reichhelm type obtained from the American Gas Furnace Co. are used to supply air for the burning mixture (Fig. 2). Each blower is capable of delivering 36,000 cubic feet of free air per hour at 2½ lb. pressure. All the pressure blowers are motor-driven, and two are coupled to feed the larger battery of ten furnaces. The maximum horse-power required to supply air under pressure for the whole of the furnaces in the large room is 45.

The air and gas are supplied by pipes laid below the ground level in a trench running parallel with the back of the furnaces. The sizes of these pipes are sufficiently large to admit of one or more furnaces being thrown in or out of action without disturbing the steadiness of the supplies to the remainder; that for air is 9 in. and that for gas is 5 in. to the larger battery, and 4 in. in diameter to the smaller. Connecting pipes from each of the two services are attached to a horizontal girder for support, and conduct the air and gas into a mixer devised by Brayshaw. A sectional drawing is shown by Brame,* but the pressures for gas and air respectively stated thereon do not correctly describe the Mint working conditions, which are 3 in. for gas and 2½ lb. for air. Check gauges are in use to determine whether these pressures are obtained at the furnaces.

Fig. 5, A, is a sectional elevation of the furnace, showing the crucible, muffle and cover, the gas and air pipes with nozzle and burner brick in position, and the main flue with its connections.

Fig. 5, B, is a back elevation, showingthe gas and air pipes with quadrant taps, and the girder support.

Fig. 5, C, is a plan of two furnaces without their covers, each containing a crucible. One shows the top view with flue, and the other the bottom with nozzle and burner brick.

The admission pipes to the mixing chamber are governed by valves, the levers of which move over a graduated quadrant. With well-constructed taps of this description the supply of gas and air can be regulated with precision. In the course of a heat these supplies require adjustment as the temperature rises in the furnace.

From the mixing chamber the gaseous fuel passes through a right-angled elbow pipe, 2½ in. diameter, to the furnace. To adjust the length of flame to the capacity of the furnace and secure greater melting efficiency, the internal diameter of this pipe was reduced at its extremity to 1¾ in. The method of inserting the nozzle of the burner into the wall of the furnace is the one yielding most satisfactory results. This method, which is regarded as essential with this class of furnace to an economical use of gas-fuel, was gradually evolved in the Mint, and was finally adopted in May, 1912, as the result of a series of successive modifications.

An 8-in. end-piece, screwed in position and having a diminishing bore, forms the nozzle, which is increased to 4 in. in outer diameter at its extremity and consequently presents a thickened ring of iron to the fire-brick. It is easily detached and renewed in the event of corrosion or partial fusion. It may be mentioned here that the effective combustion of the gaseous fuel appears to be aided and the amount of noise reduced by the use of

* "Fuel: Solid, Liquid, and Gaseous." Arnold, 1914. Fig. 31, p. 200.

pipes and connections with a perfectly smooth interior. To maintain this condition the mixing chamber and the delivery pipe to the furnace are periodically removed and cleansed from any accumulations of deposit.

The ignition hole of the furnace consists of a perforated firebrick of special shape. A circular recess, 4 in. in diameter, at the back of the block, which is 9⅛ in. square, receives the iron nozzle which fits the recess closely, and is surrounded by asbestos packing well rammed in. The comparatively large block of firebrick serves to keep the nozzle relatively cool. At the bottle-neck the inlet is 1¾ in. in diameter, corresponding with the bore of the burner. The passage then opens out at an angle of 30° into the well of the furnace, where ignition takes place.

The burner block is built into the brickwork, and is set to one side of the horizontal axis of the furnace well in a position to induce the flame to pass between the crucible and the side of the furnace without impinging upon either.

The crucible, which is of the Morgan Salamander type and of a special mixture adapted for use with gas fuel, is placed centrally in the furnace upon a graphite stand, 10 in. in diameter and 2¼ in. thick.

A plumbago muffle or collar, 8 in. deep, rests on the crucible to increase its initial capacity, but no cover is used for the charge during melting in the case of silver and the baser metals. About 3 in. clear space is allowed round the crucible at its greatest diameter to admit of the lowering of the tongs which lift it from the furnace for pouring. When the furnace is closed, the top of the muffle is within 2 in. of the cover.

The gas flame on leaving the ignition hole travels round the crucible in an upward double spiral. The best results in economy and efficiency are obtained when combustion is complete in the furnace itself, no flame being emitted under the furnace cover nor carried into the flue aperture. To compensate for the lengthening of the flame which takes place as the temperature in the furnace rises during the progress of the melt, the supply of gas and air is regulated by means of the quadrant taps already mentioned. Similar adjustment to maintain the correct mixture becomes necessary in the event of any variation of the gas or the air from normal pressure.

The flue aperture is 4 in. by 2 in. in sectional area, with its axis 5 in. below the iron covering plates, and opens into a horizontal duct leading from the furnace to a vertical shaft, 6 in. square, which serves for two furnaces. This shaft is connected with the main flue, constructed below the floor level. The main flue (Fig. 5 A), which runs parallel with the line of furnaces, is 3 ft. by 3 ft. in section, and, before entering the chimney shaft, which is 60 ft. high, it passes through a condensing chamber provided with baffles to intercept any solid matter carried off by the flue gases.

FURNACE MANAGEMENT.

For the prevention of accidents in the use of the large volumes of gas and air delivered to the furnaces, a recognized system of workshop procedure was necessary. The following routine was found from the first to work satisfactorily. All the air valves are opened, and the blower is then started to deliver air to the furnaces. Then, dealing with each furnace successively, the air valve is closed, the gas valve opened, the gas ignited, and the air valve reopened to its utmost capacity. So soon as the whole series of furnaces is alight, the gas and air taps are adjusted to produce the proper burning mixture in each case.

In shutting off a single furnace, the gas valve is first closed, and then the air. When dealing with the whole battery, the gas valves are closed on all the furnaces, the pressure blower stopped, and the quadrant taps turned off.

Should the blower stop unexpectedly through the breakage of a belt or from other causes, all gas and air taps are closed immediately to prevent the suction of gas into the air pipe when the pressure is removed and the formation of an explosive mixture. In view of this emergency the air pipes are, in some cases, provided with non-returnable valves which are automatically brought into action as soon as the pressure ceases. Experiments are in progress to ascertain the simplest and most effective form of safety device for such a contingency.

The furnace linings receive close attention, which is repaid by a lengthened life. The surfaces are kept free from excrescences which would obstruct the free passage of the gas flame. Accumulations of slag at the bottom of the furnace are cleaned out at frequent intervals. Faults in the brickwork arising from the alternate heating and cooling, or from other causes, are patched immediately. In general result the entire lining of a furnace is renewed two or three times a year.

VENTILATION.

Provision is made for the ventilation of the melting house by means of fans. Three Blackman fans, situated one at each end and one at the side, are installed near the roof. These can be used either for supply or exhaust, as required. If two of the fans are drawing from the room, and one is discharging into it, the whole volume of air is changed every five minutes, independently of the doors, windows, and skylight. It is possible, therefore, to keep the room clear of the fumes which arise, especially during pouring, and also to maintain the general temperature of the workshop at a reasonably low level. The latter becomes a particularly important consideration during the melting of bronze and cupro-nickel in the hot weather, and bears directly upon the efficiency of the workmen. But the flue accommodation itself is amply sufficient for the removal of any products of imperfect combustion, should these occur in the furnaces, and no inconvenience in this respect has at any time arisen in the melting houses.

COMPARISON OF COSTS OF MELTING.

Records are kept in the Department of the results of melting with gaseous fuel for comparison with similar results obtained with coke. These results are available for a period of five complete years ended March 31, 1916, in the case of gas, and for five calendar years ended December 31, 1909, in the case of coke. The periods named cover extensive operations. During the five years, 1911-16, nearly 10,000 tons (over 10 million kilos) of metal were melted and cast into bars for coinage with a total consumption of 121 millions cubic feet of gas.

A comparison of the records for the two periods shows an economy in favor of gaseous fuel under each of the following heads:

(1) Rate of output.
(2) Cost of fuel.
(3) Cost of graphite goods.
(4) Cost of labor.

(1) Rate of Output.—Except in the case of gold, crucibles of the same capacity as formerly were used, but the time required for the heats was shortened considerably. The rate of output per furnace in the working day was correspondingly increased, and this increase was especially noticeable in the case of the metals requiring the higher temperatures. In 1909 and in 1913 the largest amounts of cupro-nickel were melted, and, as these metals form the most stringent tests to which the Mint furnaces are subjected, the results of these years are selected to show the comparative rates of out-turn.

Metal.	Average Melt Per Furnace Per Working Day of Ten Hours. 1909 (Coke Fuel), Cwt.	1913 (Gas Fuel), Cwt.	Increased Output Per Furnace. Cwt.	Per Cent.
Gold	5.2	9.8	4.6	88.5
Silver (bars for shillings)	5.7	12.8	7.1	124.5
Bronze	5.2	13.4	8.2	157.7
Cupro-nickel	3.6	9.4	5.8	161.1

The same furnaces are used successively for melting silver, bronze and cupro-nickel. As these alloys have melting points varying more than 200° C. between the maximum and minimum, the greatest economy is not effected in all cases. The rates shown would no doubt be further improved if it were possible to allot a suite of furnaces to each metal, and to modify the burners according to the temperature required to melt each class of metal.

(2) Cost of Fuel.—The respective costs of coke and gas are well known to vary considerably in different localities. They are also liable to vary in the same locality throughout a given period, although there is a fairly constant relation between the cost of one as compared with the cost of the other. During 1905-9 the price of best foundry coke delivered broken for use at the Mint fluctuated from $8.40 as a minimum to $10.16 per ton as a maximum; while during 1911-16 the discount price of gas per 1,000 cubic feet varied only very slightly from 42 cents, except during nine months of 1915-16 when it was 37 cents. Although the price of gas advanced 12½ per cent. during the last five years, the net cost to the Mint remained practically stationary owing to the sliding scale of discounts allowed by the Commercial Gas Company.

On the total expenditure for fuel for the two periods of five years a cash saving of 3½ per cent. on the amount consumed per ton melted is shown for 1911-16. The amounts melted and the fuel consumed for the two periods are shown side by side:

	1905-9.	1911-16.
Gross amount of metal melted	4,833 tons	9,899 tons
Total consumption of fuel	2,677 tons	121 million cub. ft.
Consumption of fuel per ton melted	11 cwt.	12,220 cub. ft.
Cost of fuel per ton of metal melted	43 cents	42 cents

The above comparison is made on the basis of the gross amount melted. Owing to the general practice of melting two or more metals simultaneously, it was not possible to secure an extended series of records of the fuel, consumption for one metal alone. None whatever are available for the coke period. The following rates of consumption for the various metals are approximately true for gas, but, being based upon readings for comparatively short runs, are subject to revision. The approximate specific gravities and temperatures of pouring are added in the table, as these are essential factors in the relative consumption of fuel.

Metal.	Approx. Specific Gravity.	Approx. Temperature of Pouring, ° C.	Cub. Ft. of Gas Used Per Ton Melted.	Cost Per Ton with Gas at 42c. Per 1,000 Cub. Ft.
Gold	17.3	1,150	7,000	$2.94
Silver	10.35	1,090	12,000	5.04
Bronze	8.9	1,165	14,500	6.09
Cupro-nickel	8.8	1,300	22,000	9.24

(3) Cost of Graphite Goods.—The crucibles used for both the coke-fired and the gas-fired furnaces were of the Morgan Salamander brand, the mixture being modified in the latter case to suit the firing. A considerable extension of life was found when they were used with the gaseous fuel. In addition to minor causes, this was mainly due (a) to the greater uniformity of combustion in the furnace, and (b) to the absence of abrasion to the soft skin of the heated crucible which is unavoidable during the periodical poking down of the fuel in the coke furnace.

The total inclusive costs for the two periods are placed side by side, and show that the rate per ton melted has been reduced by about one-third.

	1905-9 (Coke Fuel).	1911-16 (Gas Fuel)
Weight of metal melted	4,833 tons	9,899 tons
Total cost of crucibles, etc.	$48,125	$65,475
Cost of crucibles per ton melted	$9.55	$6.43
Rate of reduction in costs	.....	32.6 per cent.

The figures for costs shown cover in each case the purchase of muffles, covers, stands, and stirrers as well as of crucibles. In the latter period the total amount includes advances in price due to the war, and also extra costs incurred in the earlier stages before the manufacturers supplied crucibles specially suited for use with gaseous fuel. The mixture now employed gives excellent results. The improvement in the quality of the crucibles is reflected in the reduction in the rate of cost per ton melted. Comparing the years 1911-12 and 1915-16, the first and last years of the gas period, the drop was from $8.88 to $5.45 per ton melted, and comparing the five years, 1905-9 (using coke), with last year, 1915-16 (using gas), the reduction was from $9.55 to $8.88, or about 40 per cent.

The two tables which follow are compiled to show the total costs for fuel and for graphite goods, as well as the average rates of those per ton melted, for the several years of the two periods under review.

(4) Cost of Labor.—Coke fuel necessitates considerable handling; gaseous fuel is delivered at the furnace without manual labor. During 1905-9, the average annual consumption of coke was 535 tons. Two men were employed in each melting house to transfer the coke from the store to the furnaces as required and to remove the ashes and clinker. This labor, as well as that of periodically feeding the furnaces, was abolished with the introduction of gas fuel. The coke store, which was 37 ft. by 12 ft., was no longer required for this purpose, and this valuable floor space was embodied in the main furnace room. Ashes and clinker were ground and washed for the recovery of the precious metals. With gas fuel the grinding and washing is confined to crucibles and furnace linings, and the bulk for treatment is considerably reduced in consequence. The weight of the grindings for each 100 tons of gold and silver melted under the two systems is estimated to be as follows:

	Gold.	Silver.
With coke fuel	4.3 tons	3 tons
With gaseous fuel	1.3 tons	0.5 tons

Viewing the staff as a whole, the number of men required for a given out-turn of coinage bars was reduced by the change of practice at the rate of about 20 per cent.

	1905-9.	1911-16.
Average annual melt	967 tons	1,980 tons
Average number of men employed	16.2 men	27 men
Average number of men per 100 tons melted	1.68 men	1.36 men
Rate of reduction of labor	.....	19 per cent.

A comparison of the actual expenditure for the two calendar years 1909 and 1913 was made under three headings, viz. Fuel, Crucibles, and Wages, the money value of which can be most readily ascertained. The result

showed a saving in the latter year of $5.47 per ton, or 27.6 per cent. of the total cost in 1909. This economy on the year's melt of 1958 tons, at the average rate of $5.47 per ton, amounted to $11,160. For this comparison, piecework wages which vary with the rate of output is excluded, and only standing wages which vary with the amount of labor required is stated.

		Annual Expenditure.				Rate of Cost per Ton Melted.			
Year.	Weight of Metal Melted, Tons.	Fuel.	Crucibles, Etc.	Wages.	Total.	Fuel.	Crucibles, Etc.	Wages.	Total.
1909	1,198	$7,275	$12,720	$4,695	$4,690	$5.83	$10.18	$2.77	$18.78
1913	1,958	10,810	13,065	5,305	29,180	5.30	6.41	2.59	14.30

The chief item of cost occurring with gaseous fuel but not with coke arises in the provision of power for the pressure blowers. This item, however, is a comparatively small one. In the large room the electric current supplied is at the rate of 2 B.T. units per furnace-hour. The all-round cost for power is estimated to be at a rate not exceeding 48 cents per ton melted, taking the current at four cents per unit. This item has not been included in the foregoing tables of costs, as it is considered that sundry minor economies effected under the new system balance this additional outlay.

In connection with the general subject of costs, it may be of interest to state the initial outlay made in providing the new buildings with the plant specially required for melting with gas. The cost of the motors and blowers, the four 1,000-light meters, the pipes and connections for the gas and air services and the burners with their accessories was $9,920. The capacity of this melting plant under ordinary conditions is represented by an output of about 2,000 tons annually.

With reference to the foregoing statistics, it might remove possible misapprehension to state that the figures are compiled from the working accounts of the department, and no allowance has been made for such delays and accidents as have occurred in the routine of work during the periods under review. This feature should be borne in mind in comparing the results shown for the last five years with those of special test runs frequently quoted by furnace manufacturers. In point of fact the weight of the metal which passed through the crucibles is understated in the above returns. No record is made of the weight of the spillings, filings, rough ends, and faulty bars which occur more or less with each pouring, and are re-melted in the course of the day's work. The proportion re-melted but not noted in the books varies with the several metals and also with the quality of the ingots, but the average weight melted twice on the same day is estimated to be between 2 and 3 per cent. of the total amount given to melt. Therefore, to ascertain more approximately the gross amount melted with the gas recorded at the meters, the weight stated above for 1911-16 should be increased at the rate of (say) 2½ per cent., that is, from 9,899 tons to 10,146 tons.

RECOVERY OF METAL.

An important factor in mint work is the adequate control of the precious metals given to melt. In an ordinary working day the amount of gold melted is more than three tons and is worth nearly $2,000,000, and of silver about nine tons, which in coinage value is $400,000. Obviously a satisfactory account of these values must be rendered at the close of the day. And the recovery of the metal given to work was a feature considered in choosing the form of furnace. It was ascertained by experiment that spillings of metal and splashes from the crucible were recoverable with comparative ease from a furnace with a closed bottom, while this form was more uniform in heating results than one with a removable bottom.

Larger deposits of metal in the furnace owing to fractured crucibles were also found to be recoverable. Occasionally a crack develops in the crucible when the metal is molten, and a certain amount runs into the furnace. This metal is allowed to cool after the crucible is drawn, when it forms a solid mass round the graphite stand. It is then possible to chip out the soft plumbago and withdraw the culôt of metal from the furnace.

The bottom of the furnace consists of a solid fire tile, 20 inches square and 2 inches thick, and at the junction of the lower course of brickwork and the tile a moulding of fireclay is introduced, rounding off the sharp corner. Consequently, the spillings and runners on cooling have their under side domed in shape and relieve readily. If the furnace is badly worn and the metal becomes keyed into the side, the lower course of brickwork is removed.

GOLD MELTING HOUSE.

The furnaces for melting gold are similar in construction but of smaller dimensions than those for melting silver and bronze. The room contains ten furnaces built in a single battery, and the internal measurements of the well-holes are 12 inches in diameter and 21 inches deep. The melting capacity of each furnace is about 17,000 ounces, or 529 kilos per working day of ten hours. As the general arrangements of the plant are similar to those in the larger room it is hardly necessary to specify the details.

The author has to thank Sir Thomas Elliott, the Deputy Master of the Mint, for permission to communicate this paper to the Institute, and Sir Edward Rigg, the Superintendent of the Operative Department, for kindly reading the paper in MS. The drawings and photographs were prepared by the author's colleague, Mr. W. L. Whitaker, to whom his thanks are also due.

IMPROVED MACHINE FOR MAKING METAL BRIQUETS.

(United States Consul Homer M. Byington, Leeds, England, July 31.)

Considerable attention has been attracted by a machine built in Leeds for making metal briquets. It is claimed that it will produce briquets of 2½ inches in diameter and an average length of 2¼ inches.

These products, made from metal as used in shell fuses, weigh 2 pounds 13 ounces each, and the machine is said to turn out 23 hundredweight (hundredweight=112 pounds) of briquets an hour. The saving that is produced by the briqueting of brass borings varies from 5 to 15 per cent, it is claimed, depending largely on the class of metal treated and the care and efficiency of the whole smelting process. If it is operated 20 hours a day, it is said that the machine could yield 115 tons in a week of five days.

If 7½ per cent is gained by briqueting, this means that 115 tons of metal briquets would yield 8 tons, 12½ hundredweight more metal than the same quantity of unbriqueted borings when smelted would yield. At the average price during the half year 1917 of about £120 ($584) per ton for this metal, the weekly saving would represent the sum of £1,035 ($5,037), against which would have to be reckoned the cost of briqueting. In respect of labor and power, it is claimed that this would not exceed $0.97 per ton of briquets made.

A larger machine may be constructed to turn out briquets 4 inches in diameter by about 3 to 3½ inches in height, when the output would rise to fully 4 tons per hour.

Machines for metal briqueting have been constructed and worked by a considerable number of firms in this country and on the Continent of Europe, as well as in the United States.

ALLOYS OF COPPER AND PHOSPHORUS

AN INTERESTING MICROGRAPHIC EXAMINATION OF THEIR STRUCTURE.

WRITTEN FOR THE METAL INDUSTRY BY JAMES SCOTT.

Although numerous attempts have been made to explain the exact effects of phosphorus on copper, it is still puzzling that alloys of these elements possess their remarkably intense hardness, tenacity, and resistance to abrasion. Microscopical investigation, however, enables us to arrive at conclusions without going too deeply into speculative or merely theoretical phases. We know what are the individual qualities and capacities of copper and of phosphorus, but when these are in combination quite a distinct series of manifestations occur. We have to

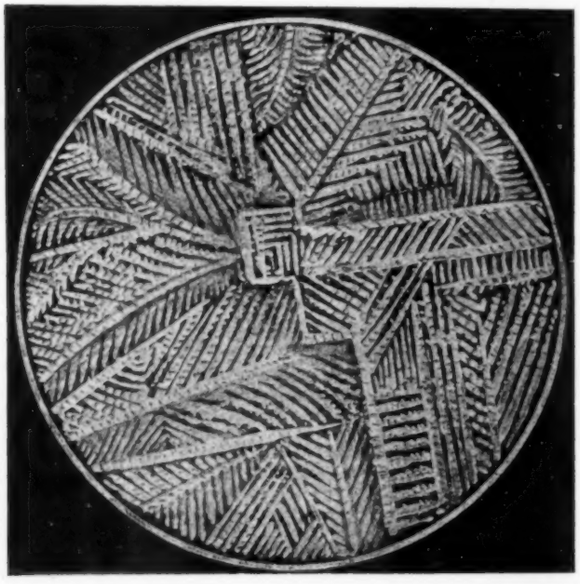


FIG. 1.—ABOUT ONE-THIRTIETH INCH OF THE SURFACE OF AN ALLOY WITH COPPER EIGHTY-FIVE PER CENT., AND PHOSPHORUS FIFTEEN PER CENT., MAGNIFIED.

bear in mind the fact that phosphorus is not a metal, and therefore its action must be quite different from that of a metallic element. Phosphorus is too well known to need prolonged description, but it may be pointed out that it is usually non-crystalline, whereas copper has a very pronounced crystalline structure. It is true that when large melted masses of *yellow* phosphorus are cooled at an exceedingly slow rate dodecahedral crystals are obtainable, that brilliant crystals follow its sublimation in a vacuum and also that a solution of it in carbon bi-sulphide yields crystals of it on evaporation, but these developments are exceptions to the general rule regarding it. Red phosphorus, produced by heating yellow phosphorus for a long time in the absence of air, is always amorphous.

When phosphorus is exposed to the air for a short time, it spontaneously ignites and yields abundant white clouds of phosphoric anhydride, resembling a fine snow, and composed of oxygen and phosphorus, which attracts moisture and condenses to phosphoric acid. A complete study of this element, however, would be irrelevant to these pages.

Phosphorus melts at about 44 degrees C., while copper melts at *about* 1.100 degrees C. Supposing we melt them side by side, the phosphorus will have become vaporized *long* before the copper is fluid. It would seem then that in the molten alloy the phosphorus is really gasified rather than fused, and is held in bondage as such by the copper to a proportional extent, with the constant probability of vanishing away from the mixed substances. In cooling, the phosphorus gases must first condense before they can be taken up permanently by the copper.

The densities, or specific gravities, of the separate elements considerably affect an alloy composed of them. If cooling covers too long a period, the heavier members will sink to the bottom and the lighter ones float. For instance, the specific gravity of copper is *about* 8.9; and that of phosphates *about* 1.8. Therefore, at certain stages the first named inclines to go down, and the second to go up, during solidification. In doing so, the compositions of the mixtures, or compounds, vary, the lower layers being copper-rich and the upper one phosphorus-rich. Proper treatment, however, can keep this trait in subjection.

When alloys containing two or more metals or associated elements are annealed there is a slow, but definite, segregation of particles. The smaller ones coalesce to produce larger ones, and these changes may follow along two courses. In one case the tiny objects themselves may shift gradually and combine together into groups;

FIG. 2—ABOUT ONE-HUNDREDTH INCH OF THE SURFACE OF AN ALLOY WITH COPPER EIGHTY-FIVE PER CENT., AND PHOSPHORUS FIFTEEN PER CENT., MAGNIFIED.

while in the other an actual solution of the substance, and unequal re-disposition of it, are traceable. Annealing does not always imply special manipulation, because many alloys are subject to its influence in their ordinary experiences, such as during exposure to high temperatures, friction, and so forth. In this way we can account for the oft-times remarkable contrasts existent in old and new alloys of the same class.

Considering this phase from a practical point of view, we learn that it is possible for a eutectic to be steadily deprived of many of its particles, which get absorbed by the bulkier masses, the primary skeletons thereby becoming stouter and correspondingly stronger, since the melting point of the constituents is raised. But if the eutectic suffers from migration of its particles the alloy is apt to become brittle and weak.

Reasoning from these matters we can understand why well-made and properly used copper-phosphorus alloys tend to improve in strength and tenacity. Any defects subsequently discovered in them are not to be regarded as inherent thereto, but as acquired through external agencies. When an alloy of this nature is just beginning to cool or freeze the first-formed crystals or primary skeletons are enveloped in a eutectic which is still fluid, and the former continues to attract some of the constituents of the latter to itself. This may be either copper or phosphorus, according to the respective percentages of these elements. In copper-rich alloys more copper than phosphorus is eliminated from the eutectic, so that the resultant copper phosphide is weaker in the actual metal.

When the copper and phosphorus are molten certain portions of both have a power of *adhesion* greater than the *cohesive* force of the remainder. In cooling, these portions solidify as joined crystals, which compose the

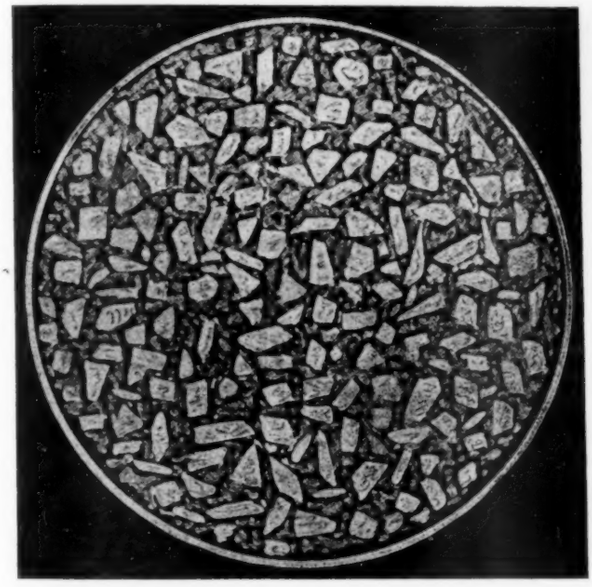


FIG. 3.—ABOUT ONE-THIRTIETH INCH OF THE FRACTURE OF AN ALLOY WITH COPPER EIGHTY-FIVE PER CENT., AND PHOSPHORUS FIFTEEN PER CENT., MAGNIFIED.

primary skeletons. The heat liberated from them passes into the still molten interstitial areas, which with their own latent energy keeps them fluid for a longer period and causes them to form the eutectic. The eutectic of a solid alloy is, contrarily, the first to melt, just as it was the last to freeze. It consists of copper and phosphorus exuded, as it were, from the compound Cu_3P, hereafter described.

A very prominent compound in copper phosphorus alloys is Cu_3P, containing 14 per cent. by weight of phosphorus, and melting at about 1,020 degrees C. The eutectic formed from this compound and copper contains about 8 2/10 per cent. of phosphorus, and has a melting point of about 707 degrees C. It separates pure from molten alloys, although during the subsequent cooling the surrounding copper is capable of dissolving a small proportion of it.

Alloys containing less than 8 2/10 per cent. of phosphorus have primary skeletons of practically pure copper in a matrix of eutectic; but with from 8 2/10 per cent. copper to 14 per cent. of phosphorus the primary skeletons are composed of the compound Cu_3P.

Owing to the volatile nature of the phosphorus, alloys containing more than 15 per cent. of phosphorus have to be melted in close vessels, otherwise there is waste of materials.

The eutectic of copper phosphorus alloys exceeds copper in hardness. The compound Cu_3P is also very hard, surpassing in this respect specially prepared tool steel. It is, however, somewhat brittle, and has to be modified physically by the eutectic. Its color is greyish.

The small amount of phosphorus used in connection with phosphor-bronze (generally less than 1 per cent.) simply serves as a deoxidizer for the alloy, which is commonly prepared by adding to an alloy of copper and tin, etc., a copper phosphorus alloy containing 8 to 10 per cent. of phosphorus.

Copper is always liable to disintegrate under the influence of oxygen, and to consequently produce corrosion patches, indicated by squares, triangles, hexagons and other geometrical figures over its grains. To what degree this happens in copper-phosphorus does not greatly concern us at present; but the capacity has to be noted because faults which may rise in carelessly-treated alloys of this kind would not be due to the original quality of the alloy.

Phosphorus confers upon copper the power of combating corrosive influences, and this trait is quite as important as the others which render the alloys, or preparations (bronzes especially) of them, so highly valuable.

Copper crystallizes as octahedra and rhombic dodecahedra. In alloys with phosphorus, while cooling, it therefore strives to cause itself to assume these particular formations, whereas the phosphorus endeavors to volatilize. Between the two efforts many gradations can be found. Repeated melts need extreme caution because of these innate characteristics. Perfect equilibrium should be aimed at.

During the solidifying stages of copper-phosphorus, the eutectic assumes a laminated structure. Minute particles, or crystals, get coated with successive deposits, which, if equally distributed, resemble a set of close-fitting cases inside one another. If there was only eutectic present the sides of the cases (the laminations) would blend or fuse together into a compact block, thus producing an enlarged crystal or grain over the initial nucleus. But the compound Cu_3P prevents this entire union, and the laminations are distorted, or incomplete, through the pre-existence of the Cu_3P. On the surface, where the supply of fluid metal is not sufficient to enable them to join up so much as they do inside, and cooling causes simultaneous stoppage, their glistening edges form extremely beautiful minute patterns, of the kind shown in No. 1. They need a good illumination to disclose their striking elegance. This alloy was kindly supplied to the writer by the Phosphor Bronze Company, Ltd.

The laminations or deposits are themselves composed of smaller crystals, which fuse indistinguishably together into planes during the prevalence of heat. In Fig. 2 is shown a part of Fig. 1 magnified to a greater scale, to explain this phenomenon.

While the laminations can be found in carefully-made sections of an alloy, a fracture reveals the crystallization shown in Fig. 3. It should be remembered that the inside of the alloy consists of plates at various angles pressing between other portions, and that all are capable of welding together, dividing, and so on, if given the opportunity. A fracture shows cleavage planes of the many crystalline bars, plates, besides minute crystals themselves. It is, by the way, usual to speak of these little objects as crystallites, but that is an optional matter. None of them are, of course, visible to the naked eye.

BRASS FOUNDRY PRACTICE

THE STORY OF THE TRIALS, TROUBLES AND TRIBULATIONS OF THE BRASS FOUNDER.

WRITTEN FOR THE METAL INDUSTRY BY W. R. DEAN, FOUNDRY SUPERINTENDENT.

(FINAL PAPER)

The labor situation is perhaps the biggest bug bear at present. Labor is scarce, wages high and quality poor. There is only one way to eventually get the best labor and keep it, and that is by the method of scientific management of high wages and low labor cost. You say that sounds fine, but it can't be done, that labor won't stand for it, are independent, and that when you start using a stop watch for time studies they become suspicious, get mad and quit, etc. But this is not so if it is done in the right way. The best way is to get all the men that are to be affected together and explain to them that it will be for their own good and that they won't be the losers. Of course before starting you should decide whether you will use the differential bonus, piece work, or premium system and explain to the men the advantage they will get by the new method of paying.

Also impress on them that things will be standardized, flasks, rigging, etc., and everything done to enable them to make good. The best plan is to guarantee them their regular day wages any way and extra, according to method adopted. In any shop there is always one man at least that will listen to reason, and who is willing to co-operate with you. This is the place to start, but do not expect great results at first or even in a few weeks or months, for it takes two or three years at least to get all the men made over. After getting one man under way and standardizing his operations, equipments, etc., and getting him to the point where he is making high wages, it is very easy to get others to fall into line. When the others see this one making high wages, with no more exertion than before, they want to try it. It may mean a good deal of shifting men before you get a good set but when you do get one that one will not go back to the old way for anything.

At the prevailing wages of, say, 25 to 28 cents per hour for unskilled labor, depending on the locality, the man who expects even 30 per cent efficiency is crazy.

The one great trouble in all plants is paying all labor the same. Some are worth more than others and should receive some extra compensation according to their worth. In any shop you can pick out some that show an inclination to be on the job every minute and are good workers, while others watch the clock and try as hard as they can to do nothing; they work harder at trying to see how little they can do than they would have to in doing their work. It is not right to set a hard and fast rule to pay all these men the same. It makes the better men discontented, and they soon quit or don't do all they can and would do if you gave them more than the lazy ones.

If you give the better ones more the lazy ones want more, you say; well, probably they do, but you can tell them to earn it, and if they do why give it to them, but usually they will quit and you should worry, to use a slang expression, for my experience has taught me that you don't lose a great deal and by a little careful selection, on account of higher wages, you can get more and better men. Hire them at the wages paid the quitters with the understanding they will get more as they show their ability to earn it. It may take a little time to get a gang to select from but it can be done and you will get them in a shorter time than you think, because, the higher wage slogan will be passed along and they will come.

When you get a good lot of men together they should be taught carefully their duties, used according to their special ability and paid according to their worth, not all alike. They should be earning at least 30 to 40 per cent more than formerly. When you have a crew like this you have reduced the original crew quite considerably. I have seen a set of 15 men that could have been reduced to 8 if they had been selected according to the above. This is the high wage and low labor cost, or the beginning of scientific management, efficiency, or whatever else you like. Just to illustrate the saving: 15 men at $2.25 per day is $33.75; 30 per cent increase in wages and 50 per cent reduction in labor is 8 men at $2.93 per day each, or $23.44, a saving of $10.31 per day or $3,093.00 per year. You say that reads well, sounds nice, etc., but cannot be done. That is where you are wrong for it has been done wherever Joys' methods of scientific management has been introduced. It has been demonstrated for a number of years that the average man works at only about 25 per cent efficiency, and the best workers under old methods at about 35 to 40 per cent. Now, any one will agree, if they know their business and are the executives they claim to be, that a man can, by teaching and an *incentive*, be brought up to higher efficiency, some men reaching 100 per cent. The incentive must be there, though.

The best way to accomplish what I have outlined is by the task and bonus system. I am speaking now of unskilled labor only, skilled labor has to be treated somewhat differently in regard to paying, according to the class and work done.

The above is only a brief outline of what can and should be undertaken to help the labor situation. But don't misconstrue me to mean that it can be accomplished in a few weeks for it takes time and patience, tact and careful procedure. Do not let the men get antagonistic, wait the opportunity and find one willing and who shows an inclination to work with you; then educate him first.

You have to educate and teach the men to your ideas. Every teacher knows that it takes an inexhaustible supply of patience and time to teach the uneducated and illiterate men one gets for general labor in the foundry, and if they are in an antagonistic attitude many disappointments will result before you have accomplished the desired end. The reward of final achievement justifies all time and worry spent.

There is one other trouble to contend with that tries your patience still more, and that is a management that wants to interfere or dictate or thinks you are not accomplishing results quickly enough. When the superintendent or an employer hires your men for you why you have to take what are given you or go without.

Usually the management wants immediate results, building for the future doesn't count with them as a general rule. Immediate results are accomplished sometimes by a slave driving boss but the minute he lets up or leaves, that is the end, while by scientific management the men want to do the thing and when a boss leaves there is another all ready and educated to take his place.

Scientific management is like a sponge absorbing all you can at first and then squeezing out gradually a quality of achievements that later produce more saving and

lasting results than being like a thunder storm, a lot of noise, a lot of rain and then over until the next rain storm, which sometimes comes in a few days or not until several months.

The moulding proposition is still harder and takes more skill and patience as moulders knowing their trade will not be shown new ways to do the job without a lot of trouble. I will not attempt to go into details, as it would take too long.

One other trouble sometimes met with, but which is more easily overcome is faulty design in pattern or article to be made. Most designers don't consider the foundry end when designing a new part, or it seems that way, at least. Especially is this so in work to stand pressure, and here is where design should be considered.

Often high leakers are as much the fault of design as of poor foundry practice.

The old foundryman has had many troubles to contend with but standardized conditions, planning, etc., as brought out by scientific management is eliminating such trouble in the modern, up-to-date foundry.

(The End.)

SINGLE OR DOUBLE NICKEL PLATING SALTS, WHICH?

A Comparison of Nickel Ammonium Sulphate Solutions With Nickel Sulphate Solutions.

Written for The Metal Industry by Joseph Hass, Jr.

Notwithstanding the many advantages that nickel sulphate ($Ni\ SO_4, 7\ H_2O$) has over nickel ammonium sulphate [$Ni\ SO_4\ (N\ H_4)_2\ So_4, 6\ H_2O$], many platers persist in the use of the double salt solution in preference to the single solution. True many use only the double salt as a working base, and replenish their solutions with the single salts. Nevertheless, the evil that there is in double salts remains an dexerts its influence. The following is a table of comparison between the two salts:

$(NH_4)_2\ Ni\ (SO_4)_2\ 6\ H_2O$	
(1) Contains 14% metal.	Contains 21% metal.
(2) Difficult to dissolve.	Easy to dissolve.
(3) Solubility at 15°C: 2.5 in 100 parts water.	Solubility at 15°C: 75.6 in 100 parts water.
(4) In cold weather salt crystallizes out.	Does not crystallize out.
(5) Is a complex salt of low metal ionization.	Is a simple salt with high metal ionization.

From this table it can readily be seen that double salt solutions are not as flexible as the single salt solutions and that the limits between which the solution can be worked are small, due to the nature of the salt. From the solubilities, it is impossible to make a double salt solution that will contain 3 ozs. of metal per gallon and be worked between 15°C-25°C, the limits of the temperature of the plating room. From the first four items of comparison the following conclusions are to be drawn: Double salt solutions cannot be brought up to as high a metal content as single salt solutions; double salts are more troublesome to dissolve; working applicability is smaller and greater care exerted in working double salt solutions than single. That greater care must be exerted in the care of double than in single solutions. I have experienced myself and many others have told me the same. I have found in using double salt solutions, the addition of sulphuric acid frequently necessary to obtain a white, bright deposit.

When $(NH_4)_2\ Ni\ (SO_4)_2\ 6\ H_2O$ is used for plating, concentrated solutions of it are used. By application of the dissociation theory, one would be justified in assuming the existence of very little nickel in ionic state.

$(NH_4)_2\ Ni\ (SO_4)_2$	$NH_4 + [NH_4\ Ni\ (SO_4))_2]_1$
$NH_4\ Ni\ (SO_4)_2$	$NH_4 + Ni\ (SO_4)_2 =$ (2)
$Ni\ (SO_4)_2 =$	$Ni\ SO_4 + SO_4 =$ (3)
$Ni\ SO_4 +$	$Ni + SO_4 =$ (4)

That (1) and (2) would predominate, especially when we take into consideration the dilution law. To have (4) predominate we would have to have a very dilute solution, which is not the case in practice. It is not my intention to state that no Ni ions exist; but they are in a small amount. The actions that take place when the electric current is passed are numerous and very complicated. At cathode:

(1) Ni deposited by primary action.

(2) NH_4 ions migrate as a primary action and H evolved and $NH_4\ OH$ formed by secondary reaction $NH_4 + H_2O > NH_4\ OH + H$.

(3) Some Ni deposited by secondary reaction $2\ NH_4 + (NH_4)_2\ Ni\ (SO_4)_2 = Ni + 2\ (NH_4)_2\ SO_4$.

At anode:

(1) $SO_4 =$ ions migrate and dissolve anodes.

(2) $Ni\ (SO_4)_2 =$ migrates to anode.

There the action of $Ni\ (SO_4)_2 =$ depends entirely on the character of the solution. If it is acid the following actions take place:

$Ni + Ni\ (SO_4)_2 = 2\ Ni\ SO_4$.

$Ni\ (SO_4)_2 + H_2O = Ni\ SO_4 + H_2\ SO_4 + O$.

If the solution is alkaline or neutral, the following reaction takes place:

$Ni\ (SO_4)_2 = + 3H_2O\ Ni\ (OH)_2 + 2H_2\ SO_4 + O$.

These reactions at the anode go to prove why double salt solutions are deprived so rapidly of their metal. Some of the products of electrolysis, instead of acting on the anode and dissolving it, react with water, and the energy consumed in the migration of the ions is lost in actual work accomplished. Not so with a single salt solution, containing boric acid. The ionization is simple, and the products are simple and direct.

The NH_4OH found at the cathode reacts with the solution, producing a hydroxide of nickel. It is a well known fact that sludge accumulates much more rapidly and in greater amounts in double than in single salt solutions. Also where work is plated for two hours or more this hydroxide settles on the work and gives it a greenish and gritty appearance which makes hard work for the buffers.

Another fact worthy of notice is that higher voltages are required to plate from double than from single salt solutions. This is not at all surprising when one takes into consideration the amount of Ni ions present in solution. A certain force is necessary to set all ions in motion in the proper direction. Since, the Ni ions in a double salt solution are small, a greater force is required and must be maintained, than if the Ni ions were present in greater amounts as is the case in a single salt solution.

[Authorities on electro-chemistry give the formula for the double nickel salt as $N_1SO_4\ (NH_4)_2\ SO_4\ 6H_2O$. We leave it to our readers to decide if the nickel absorbs all the SO_4.—ED.]

DESIGN VALUE OF DECORATIVE MOTIFS

A Series of Articles on This Interesting Subject Has Been Prepared by the Author With the Object in View of Giving the Student Craftsman in Art Metal Work a Comprehensive Idea of the Design Value of Decorative Motifs, Their Characteristics Peculiar to the Particular Period or Style in Which They Appear and so far as Possible to Explain Their Origin, Symbolic Significance and Decorative Value. It Is the Author's Sincere Hope That the Series Will Fulfill the Purpose for Which It Has Been Prepared—Second Paper.

Written for The Metal Industry by A. F. Saunders, Designer Benedict Manufacturing Company, East Syracuse, N. Y.

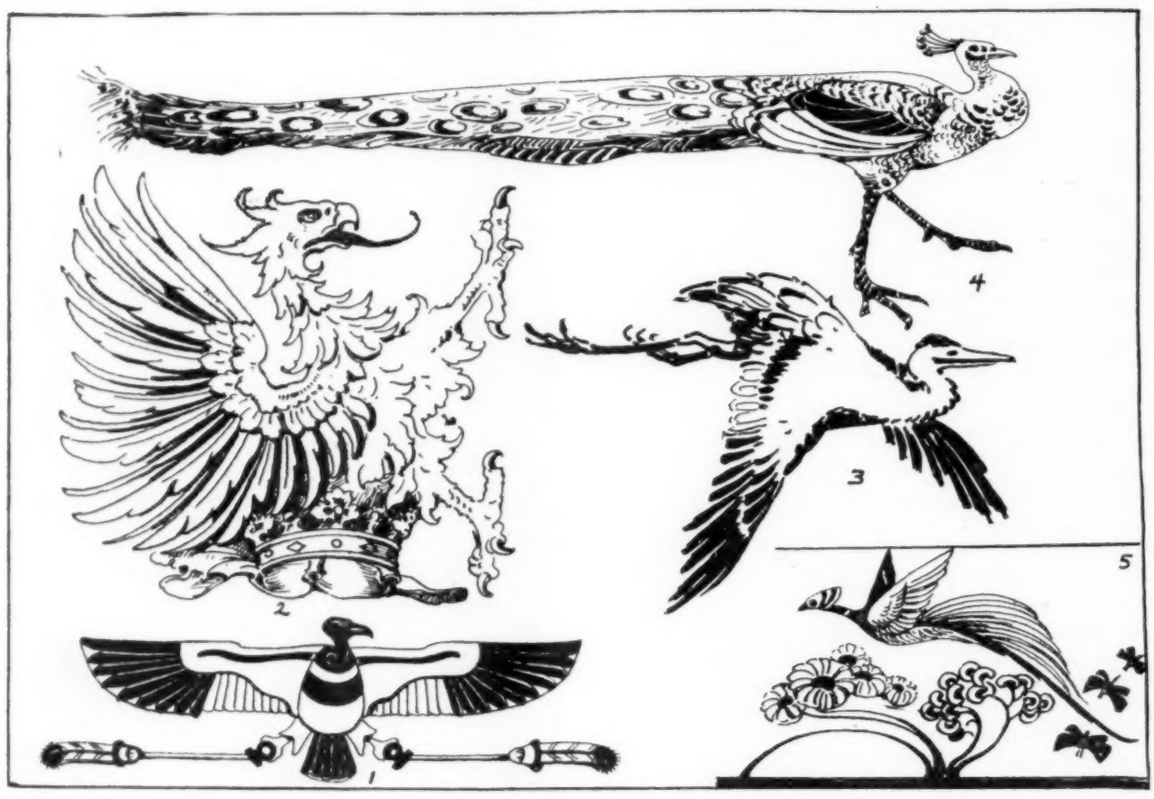


PLATE 1.

1.—EGYPTIAN, SACRED VULTURE. 2.—HERALDIC EAGLE. 3.—JAPANESE DECORATIVE MOTIF, CRANE. 4.—MODERN, PEACOCK, DECORATIVE MOTIF. 5.—MODERN, BIRD OF PARADISE, DECORATIVE MOTIF.

DECORATIVE VALUE OF THE BIRD.

To quote that talented artist and designer the late Walter Crane, "Art, like the parti-colored shield of the fable, has two sides, or fields, which—to maintain our heraldic simile—are constantly counterchanged one upon another in the evolution of design." These may be broadly distinguished as:

1. ASPECT. 2. ADAPTATION.

The first comprehending what we call pictorial work, with the impression, or the imitation, of the superfiicial aspects of life and nature as its chief aim; the second comprehending the province of the designer, whose object is rather to suggest than to imitate; or to express and relate by careful selection of the more permanent and typical characteristics of life and nature, or of linear forms derived from these, certain ideas of harmony and relation or of poetic thought and fancy. The object of the designer, being, in short, to ornament, his aim is rather ideal beauty then literal fact.

Nature, being admittedly the primal source of all our inspiration, it is rather curious to observe the limited range within which we have been content to seek ideas. With all the wealth of suggestion in the world about us, and the never ending variety of natural detail, the types which have sufficed for the ancient and mediaeval world and, for that matter, for ourselves, too, are, comparatively speaking, very few. How largely the ornament of ancient Assyria and Egypt is based upon the lotus, the papyrus, palm and, to a smaller degree, the acanthus, went far to satisfy the Greeks, the Romans and also their Renaissance imitators as well.

The great variety of bird life in its innumerable phases form an unlimited source of inspiration for decorative design. The use, however, of the bird as a decorative unit in a design or pattern depends to a large extent upon the possibility of keeping such forms in appropriate subjection, in their place, which in turn depends upon the art of the designer. There is a lesson for us in the artful way in which the artists of the Renaissance period contrived to keep down the creatures, graceful and fanciful, with which they peopled their scrolls; they subdued them

to the decorative key. Some sort of mystery in design is always delightful and interesting, and the perfection of a design is reached when, however attractive at first sight, it continues to grow upon you; the more one studies it the more he sees in it. With all peoples the bird has been a most important symbol and decorative motif; no other creature has figured more prominently in the religious systems of the world, few of which are free from it, and as art in a great measure owes its existence to an attempt to represent or embellish objects which are supposed to be the incarnation of spirits, the bird is an important element in art. It is here found in a great variety of forms, beginning with those so realistic that the species can be easily determined, passing down through innumerable stages of variation and conventional forms until almost all resemblance of nature is lost.

Possessing the mysterious power of flight, by which it can rise at pleasure into the realms of space, it naturally came to be associated with the phenomena of the sky, the sun, the wind and the storm; to the fervid imagination of the savage it became the the actual ruler of the elements, the guardian of the four quarters of the heavens. As a result the bird is embodied in the myths and in the art of the ancients. Its great value as a decorative motif, aside from its symbolic aspects, has been understood and embodied in the ornament of practically every period of decorative art. We find the bird a prominent feature in the ornament of Egypt. It was looked upon and held sacred as the symbol of supernatural protection, and such forms as the hawk, the eagle, the vulture and ibis were held in reverence as the emblems of Divine deities.

From the days of Caesar the eagle has ever been the badge or insignia of empire. It is but natural then that the eagle should form a decorative motif in the ornament of ancient Rome, of France when under the rule of an emperor, and in those countries which are still under the ban of despotic rule. The King of Birds, as we know, forms our own national emblem, but here he has a far different significance, representing freedom rather than power, and he is far more peaceful in appearance, though just as formidable perhaps when aroused.

To the Japanese we owe, more than to any other race, a realization and appreciation of the great decorative value of the feathered family. In fact, the living poetry through which the Japanese artist pictures the whole animal world is an innovation without a parallel; with what intelligence and artistic feeling he represents birds of all species, walking on the earth, hopping from branch to branch, or skimming through the air. The art of Japan in itself alone, in all that concerns animals, birds, fish and insects, is a complete course in natural history, and the objects of ornament and the decorative designs produced in that country are at once incomparable works of art.

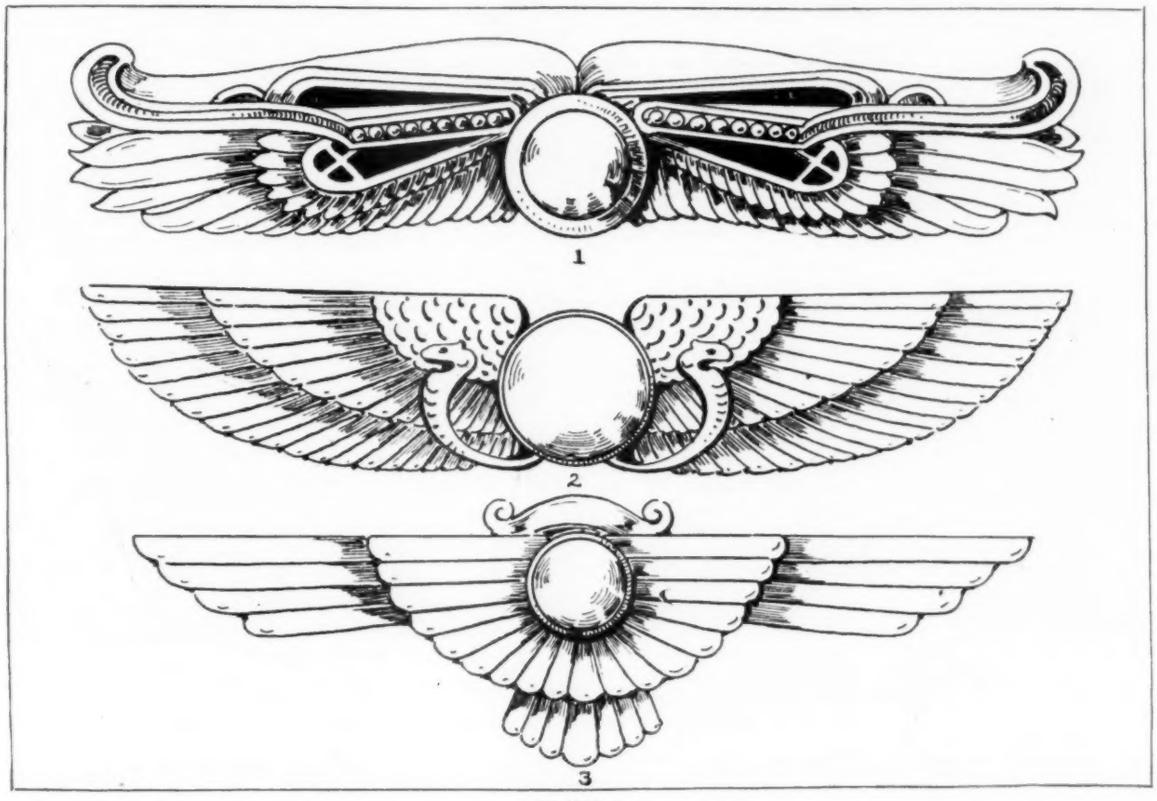


PLATE 2.

1.—AZTEC, WINGED SUN DISC. GUATEMALA, S. A. 2.—EGYPTIAN, WINGED SUN DISC. TEMPLE OF LUXOR. 3.—ASSYRIAN, WINGED SUN DISC. NINEVEH.

The bird holds its own in modern decorative styles, and the present day designer may search far and wide in nature's vast storehouse to find inspiration for his creations, but I doubt if she has anything to offer him which surpasses in decorative value her denizens of the air.

Plate 1 illustrates the possibilities of the bird as a decorative motif. Plate 2 shows the conventional winged disc or sun, typifying the light and power of the sun brought down from high by the wings of a bird. Note the almost exact representation of this symbolic decorative motif as used in the ornament of Egypt, Assyria and that of the ancient Aztec. The next article will take up the decorative value of various plant motifs.

EDITORIAL

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CONTENTS

COAL CONSERVATION

"Now is the time for every user of coal to endeavor to reduce his requirements," declares the committee of the Chamber of Commerce of the United States, co-operating with the Council of National Defense. A bulletin has been issued which contains the following five valuable suggestions as to how the use of coal may be regulated:

1. **Inquire into the methods employed by your fireman and consider his methods in relation to those suggested by the Bureau of Mines.**
2. **Learn what plants in your locality secure the best results from coal.**
3. **Endeavor to have the wasteful users of coal profit by the best experience of the locality.**
4. **Improve all local methods by consultation with the Bureau of Mines and study of the stoking methods recommended by the Bureau.**
5. **Buy your coal as near home as possible.**

Heretofore, the committee declares, the man who used more coal than he needed might feel that he caused no loss except to his own bank account. Few were influenced by thought of conserving the world's supply of coal. Today coal is a sinew of war, is the conclusion, and he who unnecessarily reduces the country's available stock of coal may curtail the nation's energy in the great industrial conflict.

"In the past if the available supply of coal was not sufficient for all needs, however extravagant, new mines could be opened and heavier withdrawals from the great supply of coal in the ground, even the most extravagant users of coal could be supplied without interfering with other industries," the bulletin goes on.

NECESSARY LIMITS MUST BE REGARDED.

Today there is a limit to the amount of coal which should be mined, according to the bulletin. In the great concentration of national energy toward prosecuting the war, men are not available to open new coal mines to meet extravagant needs. Transportation facilities are burdened to the limit of capacity. These and other factors establish a definite limit to the amount of coal which should be made available for use during the war.

Another important phase of the situation comes from the control of coal prices by the government. An effect of such price regulation may be reduction in output. It is largely to be expected that the fixing of prices can be carried on without controversies with producers interrupting operations and without repressing the adventurous spirit necessary to increase output.

"Opposed to these limitations on the available supply

of coal is the greatest demand for coal ever known," the bulletin continues. "The railroads are requiring more coal than ever before. The war and its stimulation upon industry has called upon our factories for an output beyond all previous peak loads. Our allies depend upon us for coal. Neutral countries depend upon us for coal. Good use can be made of all available coal.

COAL USER MUST BE RESPONSIBLE.

"No thinking man can fail to realize the obligation which this situation imposes upon the user of coal. On a vast scale the situation is similar to that where people are in an open boat at sea with a limited supply of food. The man who wastes coal today is an enemy of mankind.

"Under these circumstances all business men are called upon to give thought to avoiding the waste of coal. Let every man consider how his coal requirements can be reduced. Let all organizations of business men engage in a vigorous effort to promote the discussion of wasteful methods in coal consumption and the adoption in all power plants of those stoking methods which produce power without waste of coal."

Public obligation and selfish interest combine to make this the time for business men to undertake the long delayed concerted effort to improve power house practice, the bulletin says. No man today can say whose requirements may remain unsatisfied if the available supply of coal is distributed without meeting all requirements. All should act together so that no one may suffer because someone has been wastefully extravagant in the use of coal.

STOKING METHODS INVESTIGATED.

The Bureau of Mines has made a study for years of stoking methods. Elaborate investigations and experiments have been conducted and the results of what has been done are available to every user of coal. The Director of the Bureau of Mines desires that users of coal call upon this division of the government for advice and assistance.

In this connection it may be said that the Bureau of Mines has analyzed samples of coal from all sections of the United States and is already prepared to give information regarding the best uses to be made of different kinds and grades of coal. Detailed experiments and investigations enable the bureau to give effective assistance in bringing about improved stoking methods. Their tests and the experience of users of coal demonstrate that an amazing saving may be had without change of coal or equipment by merely controlling the fireman and his method of putting coal under the boiler.

REAL WORK TO BE DONE.

"There is great opportunity for associations and particularly engineering societies to conduct a campaign of education," the bulletin concludes. "Today a university in Tennessee, co-operating with the Bureau of Mines, is having men visit power plants in Tennessee to bring about the savings in coal consumption which come from consideration of the firemen's methods. Similar efforts should be made elsewhere.

"The Executive Committee of the Chamber of Commerce of the United States is forming a special committee to act as a clearing house of efforts to reduce the unnecessary consumption of coal. Business men are urged to form local committees to co-operate with this committee. Particularly are association members urged to form such co-operating committees. These committees should be organized without delay. There is real work to be done."

CORRESPONDENCE AND DISCUSSION

WE CORDIALLY INVITE CRITICISMS OF ARTICLES PUBLISHED IN THE METAL INDUSTRY

ORDNANCE DEPARTMENT NEEDS MEN

To the Editor of THE METAL INDUSTRY:

The need of the Government in certain positions in the Ordnance Department of the Army is so urgent that publishers of newspapers and periodicals can render a real service to the people in the present emergency by publishing as often as possible the inclosed announcement.

The commission will appreciate your assistance in bringing this need of the Government to the attention of the public. The commission has no appropriation from which it may pay for advertising.

By direction of the commission.

JOHN A. MCILHENNY,
President.

The announcement is as follows:

The United States Civil Service Commission announces the following open competitive examinations for positions in the several ordnance establishments of the War Department or in or under the office of the Chief of Ordnance, War Department, Washington, D. C. The salaries named are for entrance.

Mechanical engineer, artillery ammunition, $3,000 to $3,600 year.

Mechanical engineer, experimental work, $2,500 to $3,000 year.

Mechanical draftsman, $1,000 to $1,400 year.

Apprentice draftsman, $480 year.

Inspector of artillery ammunition, $1,500 to $2,400 year.

Inspector of field artillery ammunition steel, $1,500 to $2,400 year.

Assistant inspector of field artillery ammunition steel, $3.50 to $5 day.

Inspector of ammunition packing boxes, $3.52 day to $1,800 year.

Inspector and assistant inspector of powder and explosives, $1,400 to $2,400 year.

Inspector of ordnance equipment, $1,500 to $2,400 year.

Assistant inspector of cloth equipment, $80 to $125 month.

Assistant inspector of leather, $100 to $125 month.

Assistant inspector of small hardware, $80 to $125 month.

Assistant inspector of textiles, $80 to $125 month.

Assistant inspector of leather equipment, $100 to $125 month.

Clerk qualified in business administration, $1,200 to $1,500 year.
Index and catalogue clerk, $1,000 to $1,200 year.

The examination for index and catalogue clerk is open to both men and women; the other examinations are open only to men.

The Government urgently needs men for the work above indicated, and qualified persons are urged, as a patriotic duty, to apply for examination. Until further notice applications for the positions named will be received at any time by the United States Civil Service Commission, Washington, D. C. Papers will be rated promptly. Applicants will not be required to appear at any place for examination, but will be rated principally upon the elements of education, training and experience, as shown by their applications and by corroborative evidence.

Full information concerning examinations, application blanks, etc., may be obtained by calling in person upon the secretary of the local board of civil service examiners at the post office in any city in which city delivery of mail has been established, or by communicating with the United States Civil Service Commission, Washington, D. C.

THE VALUE OF CONVENTIONS

To the Editor of THE METAL INDUSTRY:

The persons who attended the Fifth Annual Convention of the American Electro-Platers' Society in St. Louis, Mo., held July 5, 6, 7, 1917, were agreeably surprised at the large number they found in attendance. The representation of the Eastern members was beyond all expectations, owing to the great expense for the long journey. Many of the members, in the past, have had to meet this expense personally, and there is no doubt that there were many more who would have attended and would gladly have done so but were not able to gratify their desire due to financial reasons.

The firms employing these men should co-operate with them in every way possible, it being directly to their advantage to do so. To cite one of many cases, one of the members who attended the convention in Cleveland last year on his return to work told his employer about the proceedings, the papers that were read and described, his trip through the various manufacturing institutions and what he saw, and told how the different firms were handling their work. Incidently he mentioned the improvements he was able to make in his methods of handling his equipment and the changes of production methods that he was able to make tending to create higher efficiency.

Before attending the convention he thought that his methods in use were the last word and could not be improved upon. This was not surprising because of all the men employed in a manufacturing establishment there are probably none who have greater opportunities for observing methods in all departments of the plant than the foreman plater. His work generally takes him to all the production departments in the establishment, and if he has acquired much experience by working in different plants it is not an unusual occurrence for him to make a few suggestions, which on subsequent adoption may either result in an increase in production or if it does not increase the production it may greatly improve the quality of the completed work.

Unfortunately many employers and employees do not realize the great opportunities this experience and observation opens up. Some suggestions made may not, for mechanical reasons, appear acceptable, but if they are put forward probably a new idea or line of action may be indicated and developed.

Some such idea as this probably occurred to the employer mentioned above. When the member finished his discussion of the convention and what he had observed, his employer asked him how much it cost. The member said: "It did not cost much, and was of greater value to him due to his opportunities of meeting so many men who represented all lines of work, and that the discussion of the various papers was of as much value as the topics covered in them." His employer got a statement from him that indicated what his fare and expenses were, and the member was greatly surprised to find a check in his mail next day covering it.

Many who attended the last convention were after specific that had absolutely no connection whatever with electro-plating, and personally paid their own fare and expenses, knowing that if they did not get the information that they would be able to get in touch with some other member who could put them directly in touch with sources where their information could be obtained.

Undoubtedly if it had not been for the war and financial reasons the attendance at the St. Louis Convention would have been tremendous, owing at the present time to the requirements of the government great demands are being placed upon the resources of the foreman of the plating department and the rigid government inspection, makes it almost imperative that something approaching standardization and mutual assistance be rendered each other. In addition to the high quality required at this time there is also a high speed of production needed.

Owing to the large demands due to war orders for production nearly all establishments find it is necessary to take inventory twice a year, and this also kept many heads of departments away because the two periods occur generally in January and July.

If it were only possible to publish the papers that were read and the discussion that followed, it would require no urging of employers to see that they were represented. As the papers are read at an open convention that is available to any one in the city who would be interested, it would seem that the bars could be let down for the trade papers to publish them, and there is no doubt that other sources of information would be thereby tapped or at least that this publicity would be the means of greatly augmenting the attendance of future conventions.

FRANCIS A. SHEPARD.

Buffalo, N. Y., August 30, 1917.

CRUCIBLE STANDARDIZATION

To the Editor of THE METAL INDUSTRY:

Noting the letter by G. H. Ames on "Crucible Standardization," in the July issue of THE METAL INDUSTRY, we wish to say that we give the article our heartiest support and would co-operate to the fullest extent with you in inaugurating the custom of buying crucibles on a performance basis rather than per number.

J. A. FLETCHER, JR.,
STERLING SALES COMPANY,
AUGUST 20, 1917. Auburn, Ind.

TO THE EDITOR OF THE METAL INDUSTRY:

We would like to secure through the co-operation of your readers, suggestions as to the advantages to be derived from the sale of crucibles on a *heat basis*, that is, price based on the quantity of metal melted. While this may possibly operate to the disadvantage of some of the inferior products, it seems to us a more scientific and accurate basis, and one that would commend itself to the consumer as being in line with modern practices. If coal is purchased on a B. t. u. basis and lubricating oil on a guaranteed mileage basis, the same principle might well apply to any commodity in which the manufacturer by long experience can practically assure the service to be rendered.

The French factories, whose crucibles are distributed by us, have suggested that in order to secure the further co-operation of American users of their crucibles, that American consumers be good enough to indicate their ideas as to what would be a fair price *per heat* of each size of crucibles. May we ask if you will kindly insert this suggestion in your publication and thus get an expression of the views of interested parties?

NEW YORK, September 7, 1917. FOREIGN CRUCIBLES, LTD.

COMMERCIAL STANDARDS

To the Editor of THE METAL INDUSTRY:

The writer was much interested in the article "Shall We Have Commercial Standards of Electro-Deposits and Government Marks of Karat Alloys?" by Charles H. Proctor, in the January, 1917, issue of THE METAL INDUSTRY, and particularly the purchase by him of supposed 14K jewelry during the holiday season. It has occurred to me that if THE METAL INDUSTRY and like trade journals will try to educate the people to insist on the purchasing of stamped articles in the jewelry line, they will be doing a great service and receive the thanks of all honorable manufacturers of gold or gold plated jewelry.

Our house has gained a high reputation for quality by stamping our output $10K and $14K, and there are other concerns as proud of their trade marks as we are.

Thanks for the instructive contribution.

EDWARD J. MULCHAHEY,
C. SYDNEY SMITH COMPANY,
AUGUST 20, 1917. Providence, R. I.

SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE

BRIGHTENING

Q.—Could you suggest any material or acids that could be used in tumbling barrels for brightening hardened steel? In further explanation would say that in finishing burnishing balls for the tumbling barrel after they come from the hardening they are first tumbled with hard sharp builders' sand and water, then with crushed pumice stone and water, then with Vienna lime and water, then with cream of tartar and water and finally with sal soda and water, sometimes putting in a small piece of cyanide of potassium as well.

The trouble experienced is that we never know for a certainty whether the balls are going to come out with a satisfactory finish when treated in this way. That is, some lots of balls will come out white and bright with a mirror-like finish and others will come out with a cloudy or milky-looking surface, and we have to start and work them over again, thus wasting a lot of time before we can get them to come out satisfactory.

Can you advise something to use in the barrel that would give the balls a bright white finish and also have the results the same on every batch.

A.—We would suggest that the following method be carried out in finishing the hardened steel balls and which will give the same results on every batch.

First—Cleanse by the aid of sharp sand and water with the addition of some sal soda to keep the water soft.

Second—Tumble in sal soda water and add a little cyanide. Dry out by the aid of boiling water to which is added a little platers' compound.

Third—Tumble in leather scraps, using carbonate of barium as the polishing medium with the scrap leather.—C. H. P. Problem 2,480.

CASTING

Q.—We have been trying to make pure copper castings. These castings are in the form of rings about 1¼ inches square and from 6 to 12 inches in diameter. The castings are porous and where they are gated there is a large shrink hole. We have tried silicon copper and boron copper, but in each case we have failed to produce solid castings. We are using an open sand and vent the molds well.

A.—The main thing in making copper castings is to have a gate large enough to carry off the shrinkage from the castings. We would suggest that the size of the gate be increased and possibly one or two risers put on. If the castings are porous it may be due to the method of melting the metal and also to a too tightly packed mold.

If silicon and boron copper are being used and there is still trouble from porous metal the chances are that the copper is not being heated high enough to allow the chemical reaction to take place. Copper in which silicon is used as a deoxidizer should be heated to at least 2,500 degrees before the silicon is added, and the same thing holds true for boron and manganese. Phosphor copper may be used to better advantage with a lower temperature of the molten copper, and if 8 to 10 ounces of 15 per cent. phosphor copper is added to the copper just before the metal is taken from the fire and the pot thoroughly stirred, good results may be had. It is, of course, necessary to keep the copper well covered with charcoal, broken to about the size of chestnuts, during the process of melting.

If it is not absolutely necessary to have the rings of a specified purity of copper, 2 per cent. of zinc will go a great way to making sound castings, and this zinc would be nearly all oxidized out of the mixture, leaving the copper content in the casting of probably 99.5, but, of course, the color would not be exactly that of pure copper.

Another cause of the trouble might be the angle at which the mold is set and by allowing air to be carried down by the falling metal would result in the formation of porous places in the casting. The fact that there is a large shrink hole in the castings and the porous feature proves that the copper is, as said before, being improperly melted or the mold is packed too hard.—K. Problem 2,481.

DRAWING

Q.—We are using drawn steel shells which are about 4 inches deep and 2½ inches in diameter. The material very often does not stand the drawing process, and the shells show cracks. Would it be possible to have these cracks repaired in order to avoid the shells being thrown in the scrap pile? It would not be possible to solder the shells as solder would not be strong enough; on the other hand, brazing and welding would be too expensive.

A.—We do not know of a method whereby you can repair drawn steel shells which have cracked in drawing. The thing to do, of course, is to prevent the cracks in the process of manufacture. These cracks may be due to a number of causes. The principal one, and the one that is likely to be the real one, however, is that the material is too hard due to uneven annealing before starting to draw it. The proper examination of the material to ascertain its weakness and temper before it is used will go a long way to cut down the loss.—K. Problem 2,482.

FINISHING

Q.—How can a mottled or flemish finish be obtained on iron?

A.—To produce a flemish iron finish the indentations must be in the iron at the beginning. This is accomplished by using a drop hammer with hardened steel dies having the indentations in relief so they will appear in the iron or steel. The steel should then be coated with a quick drying japan; not too black, and one that will dry hard at a temperature of 300 to 400 degrees.

The japan, when dry and hard, can be relieved with emery cloth of about No. 120 grade or upon a regular wooden emery wheel made from wood and covered with leather, and the emery applied with glue.

After the japan has been removed by either method given above, coat the surface with a linseed oil or lacquer to protect the iron from rusting. A hard oil finish may be used in the place of linseed oil or lacquer as it gives a heavier body, but dries slower.—C. H. P. Problem 2,483.

MELTING

Q.—I have about 70 tons of acid-resisting metal to make for pulp mill fittings. Some of the castings weigh 1,500 pounds each. The metal must be mixed to specification as follows: 90 copper, 9½ tin, ½ phosphorous. I am using the best Lake Copper and melting in a Hawley Schwartz furnace (old type). I am having a great deal of trouble with the 8-inch pipe castings. Some of them are 10 feet long and only ⅝ inch thick. When tested to 150 pounds pressure they sweat badly. I broke several of the castings and the fractures looked quite close to the naked eye, yet the microscope revealed pin holes all through the metal.

A.—In melting copper in the Schwartz furnace, it is likely to get out of pitch unless a neutral or slightly reducing flame is maintained. If the oil pipe gets clogged up or an excessive amount of air is blown into the furnace, the copper may not only be out of pitch but much oxidized and contains ½ per cent.

or more of oxygen. With copper in this condition even 1 per cent. of phosphorous will not deoxidize it completely and the resulting phosphor bronze is likely to be sluggish, set quickly and fail to free itself from dissolved gases.

After your copper is melted a test bar should be poured from it. Cool this bar in water, nick, break and examine the fracture. If the copper is not tough and shows a red instead of a pink color, it is full of suboxide. Such copper should be poled with a green hickory pole until in touch pitch and then the tin and phosphorous added. While pin holes are most frequently due to oxidized metal, numerous other causes for them may exist such as wet sand, sand that is too fine, too hard ramming, imperfect venting, etc. By careful inspection of each detail of your practice you will ascertain where it is defective and be able to correct the faults.—J. L. J. Problem 2,484.

MIXING

Q.—What should be the perentage composition of the following grades of babbitt. No. 1, 2, 3, 4, engine and high speed?

A.—There are no standard formulas for babbitts, although Sub-Committee B of the American Society of Testing Materials has for a number of years been endeavoring to select a list of five that will be acceptable to the makers and users. Five, or at the most six, babbitts would be ample for every class of service. The formulas that are commonly used for the grades of babbitt that you name are the following:

Name.	Lead.	Tin.	Antimony.	Copper.
No. 1	65.00	20.00	15.00	....
No. 2	73.00	12.00	15.00	....
No. 3	80.00	5.00	15.00	....
No. 4	78.00	1.00	20.00	....
Engine	None	89.00	7.00	4.00
High speed	None	83.33	8.33	8.33

The No. 4 grade is commonly known as 20 per cent. antimonial lead and may contain 1 per cent. of arsenic and copper if not well refined. The arsenic is not regarded as a desirable element. It has a tendency to oxidize and prevent good adherence of the babbitt lining to the tinned surface of the shell.—J. L. J. Problem 2,485.

PLATING

Q.—We would like to have expert opinion on whether or not a 3-volt, 400-ampere plating dynamo would have force enough to do basket nickel plating and regular wired nickel and silver plating. We do quite a great deal of basket nickel plating, and have been using a higher voltage, but it has been too high in voltage for our regular wired silver and nickel plated goods.

A.—A generator of 3 volts, 400 amperes would not be of high enough voltage to be very effective for basket plating, although it would be suitable for the ordinary nickel or silver plating. To do basket plating in an effective manner you should have five or six volts, as it takes too long to plate at a lower voltage.—C. G. B. Problem 2,486.

POLISHING

Q.—Can you tell us of a way to polish hard sheet brass so as to eliminate waves and keep the buffs from making pits by dragging? This brass, after it is polished, is to be nickel-plated heavily and then polished and buffed so as to produce a very high reflecting surface.

A.—The reason that there are waves or buckles in the brass is probably due to too much pressure on the wheels which causes so much friction that it heats up the metal and therefore causes the buckling. The remedy, then, would be to reduce the pressure somewhat.

It also might be due to inequalities in the wheel or the wheel itself may not run true. If you are using a felt wheel there may be some soft spots in it which would produce the same effect. Pits in the brass due to dragging cannot be remedied by any effective means relating to the wheels, but are due entirely to defects in the brass itself and must be taken care of in the manufacture of the brass.—K. Problem 2,487.

RUSTING

Q.—What will prevent the rusting of steel after it has been removed from a sulphuric acid pickling bath? It is impossible to use oil as it leaves a greasy surface and has a tendency to discolor the articles. We have been using oxalic acid, but it does not work satisfactorily as it leaves the articles white.

A.—In order to overcome rusting after pickling, we would suggest the following methods. First, wash in cold and boiling water, then in a solution consisting of boiling water, 1 gallon, and soda ash 1 ounce. Second, immerse the articles direct in paraffin oil, to which is added about 2 ounces of paraffin wax per gallon of oil. Heat to the boiling point of water. The oil will dry quickly and give a thin protective coating.

This method seems to be the most successful, and also retains the steel color, though a mixture of 1 part phosphoric acid and 2 parts denatured alcohol will also give a rust proof coating.—C. H. P. Problem 2,488.

STRIPPING

Q.—What method could be used for stripping slinging wires which are used in plating casket hardware? The wires have alternate coatings of silver and nickel, and are made of brass. I would like to know how to recover the silver which has been stripped, and how to separate it from the nickel after precipitation.

A.—For your purpose an electro-strip would give the best results, and for this purpose prepare a solution consisting of 8 parts of sulphuric acid and 2 parts of water. Use an acid crock or lead lined tank (with burned-in seams) of sufficient capacity for your purpose. The tank or crock should have three rods as a plating tank. The outer rods would be the negative, and the cathode plates should be of sheet lead or carbon. The center rod would be the positive to carry the frames to be stripped. In other words the solution uses a reversed current to that of plating. If a strong current is used the stripping can be accomplished very rapidly.

The resulting materials from stripping the silver and nickel from the frames are silver and nickel sulphate in solution. When the stripping solution becomes saturated with metal remove and add an equal amount of water. Precipitate the silver to a chloride with common salt. The nickel will remain in solution as a soluble chloride, and in the final washing of the silver chloride the nickel chloride would be entirely eliminated, leaving a fairly pure silver chloride, which can be used in plating operations. It would not pay to recover the nickel content of the strip.—C. H. P. Problem 2,489.

TUMBLING

Q.—We have been manufacturing block tin balls which are used in non-fillable stoppers for bottles, and it is very necessary that there is nothing in the way of steel in the surface of these balls, as the slightest trace of steel will discolor the liquor. Through carelessness of some of our workmen a large batch of balls got through with small particles of powdered steel rolled in the surface of same. We thought that possibly you could tell us of an acid that we could use in a wooden barrel to tumble these balls so as to eat away the traces of steel but not attack the block tin. We also wish to bring the block tin back to its natural color when finished.

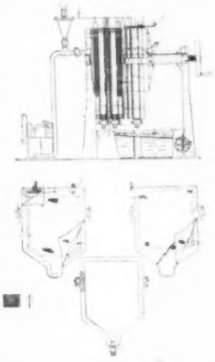
A.—Tin becomes passive in a nitric acid solution, so this acid would be the most effective in reducing the iron in solution. We would suggest that a mixture of 2 parts of nitric acid and 1 part of water be tried, or probably equal parts of acid and water would answer the purpose.

It might be possible to bring up the natural color of the tin balls again if they could be either tumbled in maple sawdust and Vienna lime or macerated leather and Vienna lime. If Vienna lime is not available then barium carbonate or floated whiting should answer the purpose.—C. H. P. Problem 2,490.

PATENTS

A REVIEW OF CURRENT PATENTS OF INTEREST

1,231,967. July 3, 1917. **Electrolytic Recovery of Metals from Their Solutions and in Apparatus Therefor.** Urlyn Clifton Tainton and Malcolm Foerster Lambe Ayme Aymard, of Johannesburg, Transvaal, South Africa.



This invention consists of improvements in the electrolytic process of recovering metals from their solutions, and of improvements in apparatus for carrying out the improved process.

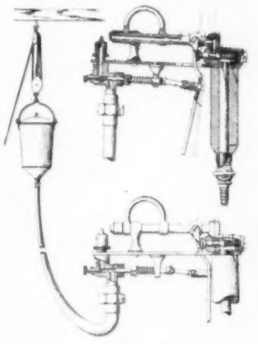
The object of the invention is to effect a more rapid extraction of the metal, and especially to obtain the metal in a form more convenient for subsequent handling and refinement.

The invention comprehends the use of an electrode of improved construction, as well as the means for and method of using the same.

According to this invention the electrode, as shown in cut, is made of porous metal, or comminuted metal, or other porous or comminuted conducting substance, or a combination of the same; and it is so arranged that all the solution to be electrolyzed is caused to flow through the interstices or pores in the electrode, which is connected to the negative pole of a dynamo or other source of electric current.

1,232,618. July 10, 1917. **Spraying or Atomizing Device.** W. J. Smart, New York.

The present invention relates to improvements in sprayers or atomizers, such as employed for moistening articles of apparel in laundries, dampening fabrics in sponging processes, applying paints, and for all other purposes where devices of this character may be successfully employed.

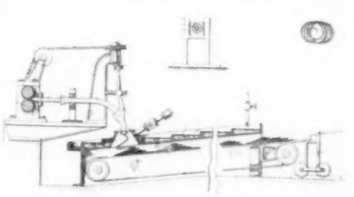


More particularly this invention, as shown in cut, is directed to a sprayer or atomizer for delivering or spraying a liquid, the flow or spraying of the liquid being controlled by the action of a gas, which is preferably under compression.

An object of the present invention is to provide a spraying or atomizing device of the aforesaid type, which may be cheaply constructed, and will embody an arrangement of its parts, whereby the necessity for adjustments or replacements will be reduced to a minimum, and where in the functioning or operation of those parts may be positively and efficiently accomplished in a way which will permit of the successful employment of the invention by any one skilled or unskilled in the use of such devices.

1,232,014. July 3, 1917. **Method of Treating Metal Rods.** V. E. Edwards, Worcester, Mass.

The present invention relates to a method of treating metal rods, and has particular reference to the treatment of wire rods as they emerge from the finishing pass of a rolling mill, whereby cooling of the same, or treatment designed to arrest or prevent oxidization thereof, in any well known manner, is facilitated.

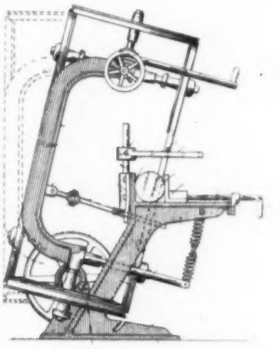


The invention resides in the several steps, as shown in cut, employed to expose, as completely as possible, the entire surface of each rod to the action of the selected cooling or deoxidizing medium, in such a manner as to render most convenient the subsequent handling and transportation of the rod so exposed.

The present invention contemplates a method of treatment by which the rod, emerging from the mill, is so coiled, while hot, that there is practically a complete exposure of its surfaces during the period of cooling, whereby the action of a deoxidizing medium may be rendered effective with respect to the entire surface of the rod, serving not only to arrest completely all further oxidization, but also to remove oxid which has already formed by exposing to the air during rolling. Furthermore, the improved method employed enables the rods, after cooling, as above described, to be formed readily into compact coils, suitable for subsequent handling and transportation in the usual manner.

1,233,430. July 17, 1917. **Metal Cutting Band-Saw.** Herbert C. Williamson, Chicago, Ill.

This invention relates to improvements in metal cutting band saws, and has for its object to provide an improved form of metal cutting band saw, which will be capable of use for cutting metal stock, or other material, of practically any thickness. Hitherto the majority of stock cutting has been done by reciprocating hack saws which are mechanically impracticable, as is well known in the trade This device is capable of cutting off stock from material of any length and of practically any width.

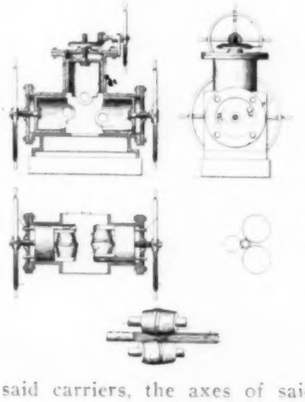


Another object of the invention is to provide an improved device of the class described which will automatically feed itself across the material when the latter is being cut, and which will prevent the saw mechanism from traveling too far at the completion of the cut should an operator not be at hand.

Still another object of the invention is the arrangement and construction of means, as shown in cut, to guide and support the saw near the cutting point thereof.

1,234,245. July 24, 1917. **Rolling Mill for Seamless Tubes.** Ludwig Wolfgram, Brooklyn, N. Y.

This invention relates to rolling mills for seamless tubes, and has for its object to provide an improved mill, by means of which the rollers may be changed to any position desired. The patent covers:



A rolling mill, as shown in cut, comprising two cylindrical ways disposed in right-line alinement, a third cylindrical way extending outward at right angles to said two cylindrical ways at the inner ends thereof, roller carriers movable in said alined ways toward and from each other and provided with bearings at their adjacent ends, rollers journaled in said bearings and having their axes at right angles to the axis of said carriers, the axes of said rollers being oppositely in-

clined in parallel planes, means for adjusting said carriers toward or from each other to change the distance between said rollers, means for turning said carriers to shift said rollers into different inclines in their parallel planes, a cylindrical roller carrier movable in said right angled way and provided with bearings at its inner end, a roller journaled in said last named bearings and having its axis at right angles to the axis of its carrier, means for adjusting said last named carrier inward and outward within said third way, and means for turning said third carrier to shift its roller with relation to the other rollers.

1,234,547. July 24, 1917. **Process of Making Bearing Metals.** W. H. Kelly, Los Angeles, Cal.

The invention has for its object the production of a bearing metal suitable for all surfaces subject to friction, which has great heat conducting qualities. The inventor says:

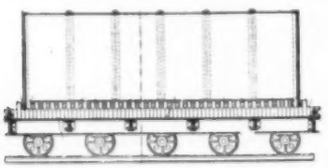
"In carrying out my invention I first take common commercial pig or scrap metallic lead and melt the same in a suitable crucible or melting pot. When the metallic lead is reduced to a molten condition I introduce a mixture of oxygen and hydrogen into the molten mass and submit it to its action for a period of time ranging from thirty to forty-five seconds.

"The purified or treated lead may then be run into bars or pigs for future use or may be mixed at once while melted with copper of suitable purity to make the mixture of required proportions.

"To the metallic lead which has been subjected to the action of oxygen and hydrogen as above stated I add the required amount of commercially pure metallic copper. The two metals may be melted together or may be combined after each has been melted separately. In either event the combined metals should be heated to a temperature of over 2,000 degrees Fahr. before the composition is poured into the molds."

1,234,789. July 31, 1917. **Truck or Stand for Use in Annealing Furnaces.** T. A. Morris, Llanelly, Wales.

The invention relates to trucks or stands which are used in an annealing furnace to carry the plates or other articles through or into and out of the said furnace.



The objects of the present invention are to construct a truck or stand, as shown in cut, which will increase the life of annealing pots or covers, which will always provide a dead flat annealing surface, which will provide a perfectly air-tight compartment, which will evenly distribute the heat, and which will accommodate annealing pots or covers of different sizes, for instance, one large pot or two smaller ones. The patent covers:

An improved support for use in annealing furnaces, having bricks closely arranged on their long edges to produce an upper flat surface, other bricks closely arranged on their ends to produce a rim standing up above the said flat surface, a third series of bricks standing on said flat surface and acting as support, and separate metal plates on said supports of such dimensions as to leave a space between them and the said rim to receive the annealing pot.

1,235,136. July 31, 1917. **Cleaning and Polishing Composition.** L. R. Hanaran, Kansas City.

This composition consists of the following ingredients combined in the proportions stated, viz.:

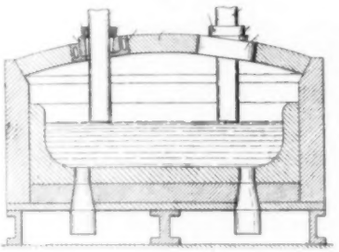
Gasoline	3½ pints
Japan drier	1 pint
Varnish	½ pint
Boiled linseed oil	1 pint
Paraffin oil	1½ pints
Vinegar	½ pint

These ingredients are to be thoroughly mingled by agitation.

In using the above named composition remove all dust with a dry cloth, apply polish thoroughly, then rub with a soft cloth, rubbing with the grain of the wood as much as possible.

By the use of the above composition it removes all dirt and grease and restores the life and original luster of furniture, piano or automobile, cleans and polishes perfectly and leaves a dry lustrous surface free from streaks.

1,234,946. July 31, 1917. **Electrode Packing for Melting Furnaces.** Martin Sperling, of Essen-on-the-Ruhr, Germany, assignor to Fried. Krupp Aktiengesellschaft, of Essen-on-the-Ruhr, Germany.

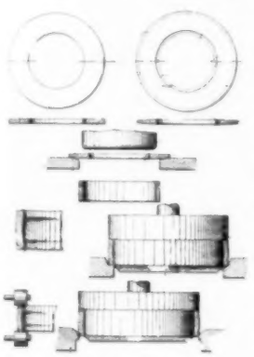


The present invention relates to electrode packings for melting furnaces, which have the electrodes mounted in an annular member in the furnace cover. The object of the present invention is now to provide an electrode packing, which is applicable not only to electrodes that are freely suspended, but also to electrodes which are firmly fixed in the usual manner on an electrode carrier. The invention resides in the use of an interchangeable packing ring, closely fitting around the electrode, and resting on top of the annular member, which incloses the electrode leaving considerable play, the annular member and the packing ring being easily displaceable relative to each other transversely to the electrode.

One embodiment of the invention is illustrated in the accompanying drawing showing a melting furnace in vertical section with electrode packings.

1,236,470. August 14, 1917. **Method of Making Copper and Similar Bands.** G. E. Neuberth, Newark, N. J.

This invention relates to an improved method of making metal bands, being particularly adapted to the manufacture of bands of ductile metal, such as copper, such bands being used on projectiles, whereby a tight fit in the rifling of the barrel of the ordnance is insured.



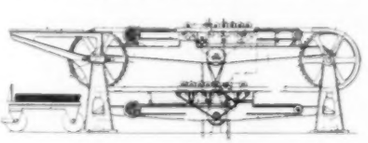
The invention consists in the manipulation of a ring or flat washer of copper or other suitable metal, such manipulation eliminating operations at present expensive and thus reducing the cost of production to a very great extent.

Furthermore, there is a saving of time in the manufacture of the bands, the character of the different operations making this saving of time possible. The number of bands made within a given time under this method is much larger than under old methods with the same number of operatives.

This method also simplifies the work of making a band, the operations being quick of accomplishment and furthermore turning out bands in which the metal is well compacted, and firm and solid throughout. The process of making the bands is illustrated in the accompanying cut.

1,237,805. August 21, 1917. **Solder Strip-Coating Machine.** Edwin Norton, of Paget West, Bermuda; Lucy E. Norton, executrix of said Edwin Norton, deceased.

The invention relates to new and useful improvements in solder applying devices and more particularly to devices for applying solder to metal in sheet form prior to the same being cut into blanks to be utilized in forming can bodies, or the like.

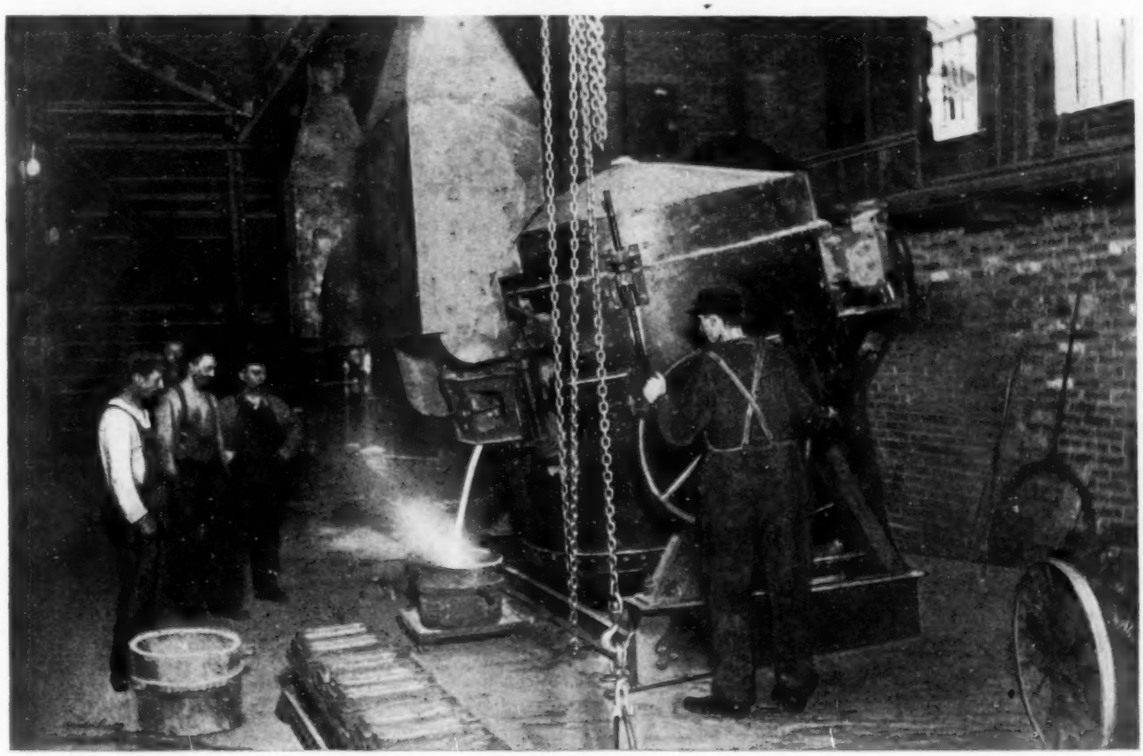


EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST.

BAILY ELECTRIC METAL MELTING FURNACES

Electric furnaces for melting brass have been under development for such a long time, without much evidence of successful performance, that any type now offered is naturally under severe suspicion, not only as to its practicability, but even as to its actual success as a melting unit. And while electric furnaces generally are admittedly desirable to former practices, if they can be made to operate successfully, the skepticism with which new electric furnaces are received has made it difficult to rapidly introduce them, even though the prevailing practice in oil-fired tilting furnaces of the open flame type, as well as in the crucible type pit furnace, whether fired by coke or coal, is such that,



POURING METAL MELTED IN THE BAILY ELECTRIC TILTING TYPE OF FURNACE MANUFACTURED BY THE ELECTRIC FURNACE COMPANY, ALLIANCE, OHIO.

with the abnormally high prices, the cost of melting, when also taking into account the metal loss, is such as to be a considerable economic loss, as well as materially affecting production at this most critical time.

The furnaces described in this article have been developed by the Electric Furnace Company, of Alliance, Ohio, after a long period of experiments with furnaces for heating and heat treatment of steel and the melting furnaces have only been put upon the market after they have been thoroughly tried out in actual service. The furnace shown in Fig. 1 in perspective and in section in Fig. 2 is made in both the stationary and the tilting type, and is described by the manufacturers as follows:

The furnace proper is contained in a steel shell supported by cast brackets, and adapted to be tilted by means of the usual hand-wheel arrangement. The bottom interior of the furnace consists of a bowl-shaped hearth, built of fire-brick, and contained in a steel pan, which is used to prevent impregnation of the lining by the metal below a predetermined depth. The lining of the hearth is made of a standard plastic material, baked in place, and can be readily patched in the usual method in the event of erosion.

Directly above this bowl-shaped hearth are placed fire-brick piers arranged radially with respect to the center of the furnace. On these piers is placed a refractory trough in which the resistor or heating element is located. The electrodes connecting up the resistor material with the outside electrical connections are two in number, and placed one on each side of the furnace, the electric current then flowing around each of the two legs of the trough.

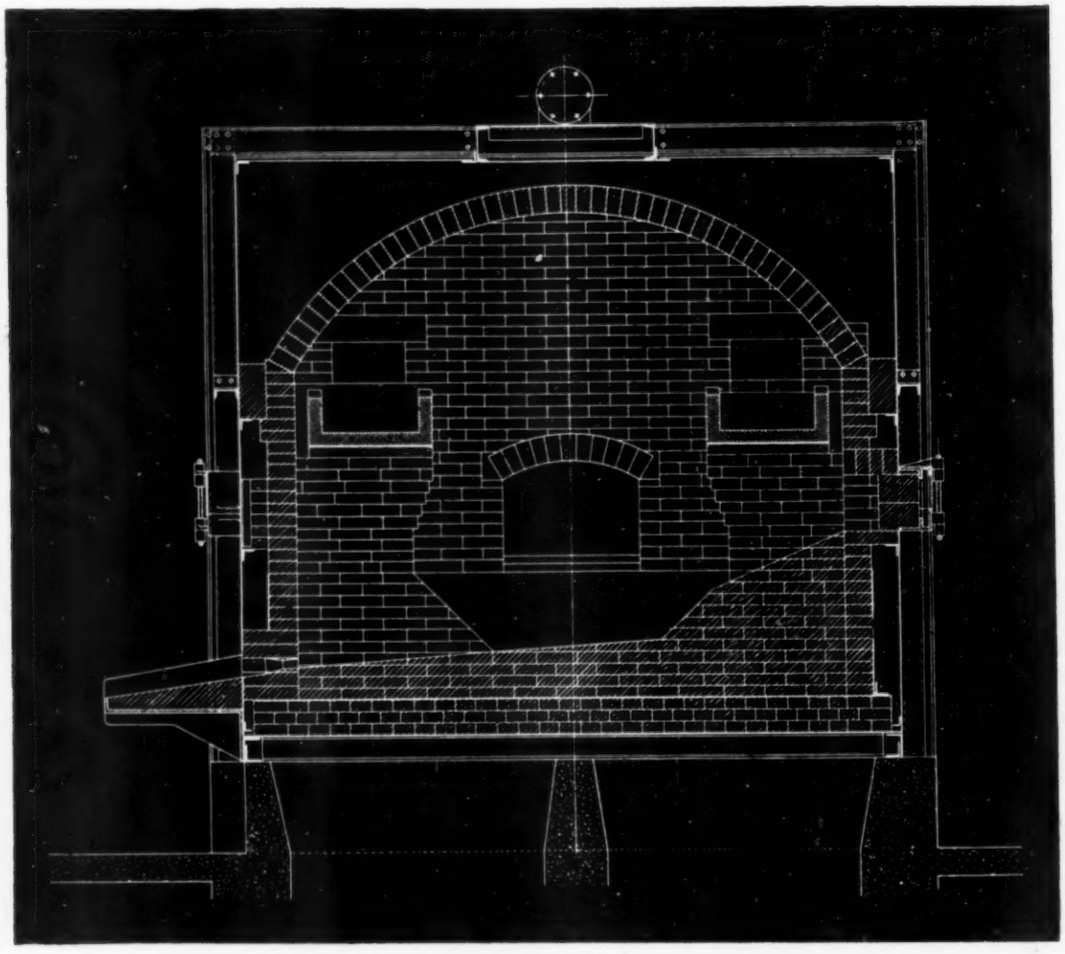
The heat generated by the resistor is radiated to the roof and sides of the furnace, and directly onto the hearth and the material to be melted. The opening for charging material is placed directly in the front of the furnace below the resistor trough, and above the metal line of the hearth. A groove is left in the middle of the fire-brick block forming the bottom of the furnace opening, which extends to the bowl shaped hearth so as to form a trough for pouring the molten metal, without opening the furnace door. The furnace door is of the plug type, fastened to the furnace by means of heavy hinges, and is provided with means for holding tightly in place, irrespective of the position of the furnace.

The resistor material, which requires renewal occasionally, is charged by means of a shovel, the roof being raised by means

of three shafts operated by sprockets and gears, the upper end of the shafts being threaded and operated through stationary nuts held by the ears, fastened to the roof band. As the top of the resistor trough is practically on a level with the top of the furnace shell proper, this charging is very readily accomplished, but is not required oftener than once in several weeks.

It will be noted that this furnace can be maintained tightly closed, excepting at the time of charging metals to be melted, hence the loss of metal due to volatilization is practically negligible.

The Bailey furnace is also built in the form of a pit crucible furnace, and this type of furnace was developed to melt smaller quantities of metals than could be handled advantageously in the hearth-type furnace described above, and requires the use of crucibles.



SECTIONAL VIEW OF THE BAILY ELECTRIC METAL MELTING FURNACE.

It will be noted from the photograph shown, Fig. 3, that the furnace proper is built along the same general lines as the furnace described above, with the exception that the openings are placed in the top of the furnace, and through these openings the crucibles are handled. The crucibles themselves are supported on small fire-brick pedestals and are so located that the heat surrounds them uniformly and uniform melting is obtained.

Due to lack of oxidation the crucibles last longer than in fuel-fired pit furnaces, and besides this the crucibles are not subjected to so much mechanical abrasion as in fuel-fired furnaces, where the fuel is packed directly around the crucible.

It is also to be noted that there is not the loss from volatilization on certain metals that is to be found in ordinary furnace practice, as when the cover is on the furnace, the furnace chamber is tightly sealed and there is no opportunity for the metal vapors to escape from the furnace itself.

This type of furnace is built in two sizes, the first having an electrical capacity of 25 K.W. and adapted to hold two No. 40 crucibles. The larger furnace is of 200 K.W. capacity, and adapted to hold eight No. 80 crucibles.

A comparison of the performance of these furnaces with those of the oil and coke type has been prepared as follows: The metal melted was, copper 65% and zinc 35%.

This comparison is based on the following figures:

	Electricity	Oil	Coke
Fuel Price	1½c per k.w.h.	6c per gal.	$9.00 per ton
Fuel quantity, per ton	400 k.w.h.	50 gals.	1200 lbs.
Metal loss	1%	5%	3%

Zinc Value 10c per pound

No. 80 Crucibles — 16c per Number (Aver. life 15 200-lb. heats.)

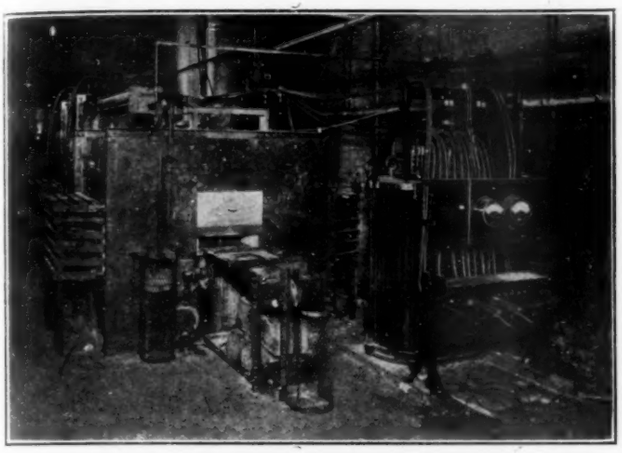
	Electric	Oil	Open-Flame Coke Fired Crucible Pit
400 K. W. H. @ 1½c	$6.00	....	....
50 gal. Oil @ 6c	....	$3.00	....
1200 lbs. Coke @ $9.00 ton	....	....	$5.40
1% Metal loss—20 lbs. Zinc @ 10c	2.00	....	....
5% Metal loss—100 lbs. Zinc @ 10c	....	10.00	....
3% Metal loss—60 lbs. Zinc @ 10c	....	....	6.00
Crucible cost, per ton of melt	....	....	8.00
Renewals and Repairs to Furnace	.50	.50	.10
Total, per ton of melt	Electric $8.50	Oil $13.50	Coke $19.50

Labor, while lower in electric furnaces than in other types, is taken as the same in this comparison.

It will thus be noted that besides the savings in labor and general factory betterment by the use of the electric furnace, there will be direct savings in melting cost, based on the above

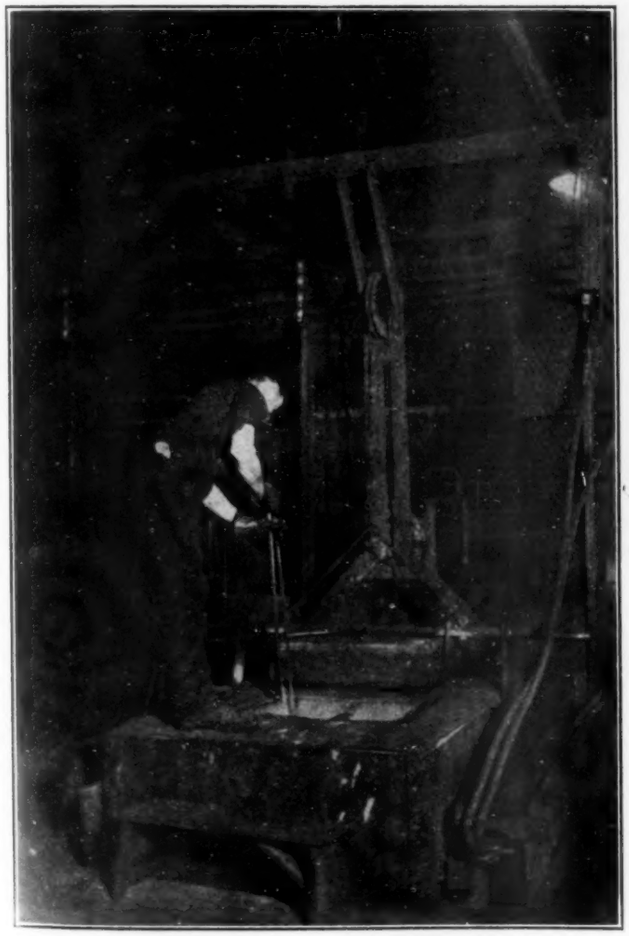
figures, of $5.00 per ton, when compared with oil furnaces, and $11.00 per ton, when compared with coke-fired crucible furnaces, besides the great advantage of being able to control the analysis and temperature of the metal with much greater accuracy.

Among the concerns now using and making installations of



THE BAILY ELECTRIC FURNACE FOR ANNEALING SHEET METAL.

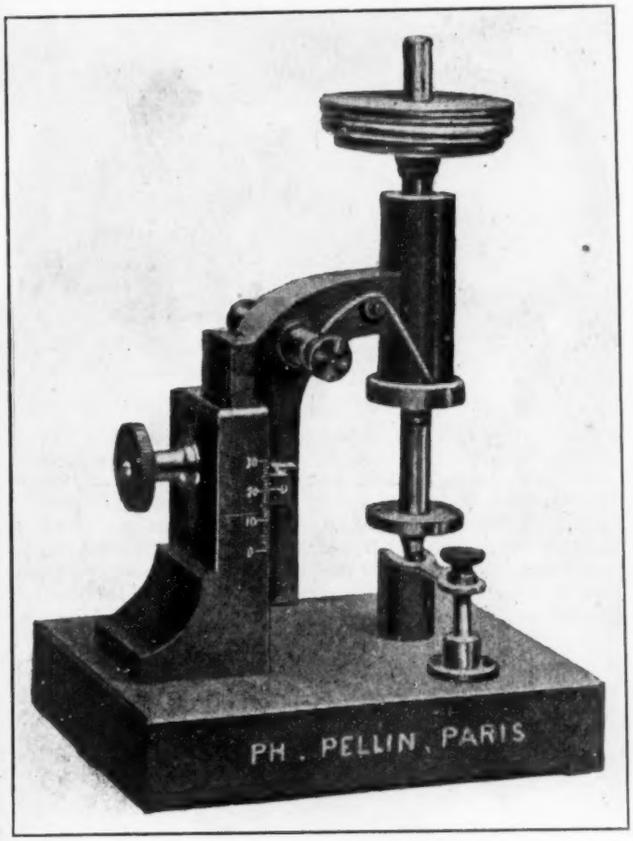
these furnaces may be mentioned the following: Baltimore Copper Smelting & Rolling Company, Baltimore, Md.; The Bridgeport Brass Company, Bridgeport, Conn.; The U. S. Aluminum Company, Massena, N. Y., as well as foundries like the Lumen Bearing, Buffalo, N. Y.; Hays Manufacturing Company, Erie, Pa., and Wm. A. Rogers, Ltd., Niagara, Falls, N. Y. For further information regarding these furnaces address The Electric Furnace Company, Alliance, Ohio.



THE BAILY ELECTRIC METAL MELTING FURNACE, CRUCIBLE TYPE.

THE PELLIN HARDNESS-TESTING APPARATUS, A FRENCH DEVICE

The Pellin hardness-testing apparatus has attracted some attention in England. It is based upon the Brinell dynamic method and has been designed for the hardness-testing of the different metals used for all industrial purposes. The apparatus is mounted upon a cast-iron base plate on which is fixed a forked spring clamp, which holds the sample to be tested in position. A dovtailed slide can be raised or lowered so as to vary at will the height of fall, its displacement being regulated to tenths of a millimeter by the aid of a graduated scale. The slide is provided with an arm having a cylindrical housing in which a steel rod slides freely, but without play. The housing ends in an annular



THE PELLIN METAL HARDNESS TESTING MACHINE. MADE BY PH. AND F. PELLIN, PARIS, FRANCE.

electromagnet connected to one of the terminals, as shown in the illustration. The rod is provided at the top with a disk designed to carry a variable series of weights, so as to produce any variation in the ball impression under shock. At the lower part of the rod is fitted a soft iron plate, the object of which is to cause the adhesion of the whole rod system when the current from a battery is closed on the electromagnet. The steel ball, 2.5 mm. (0.0984 in.), is held in a holder underneath the soft iron plate. It is easy to cut off the current instantly between the electromagnet and the soft plate by means of a circuit breaker fitted to the base plate. The rod, being liberated, acts as a hammer hardness of the specimen and the weights with which the disk has been loaded. The makers of the machine are Ph. and F. Pellin, and by falling upon the specimen under test the ball forms in this an impression, the diameter of which varies according to the 5 Avenue d'Orleans, Paris.

NEW OXY-ACETYLENE WELDING OUTFIT

The apparatus shown in the several cuts constitutes a new oxy-acetylene welding outfit, which has been invented by G. A. Baudet, 222 West Fifty-seventh street, New York, and is about to be placed upon the market by the Baudet Manufacturing Company.

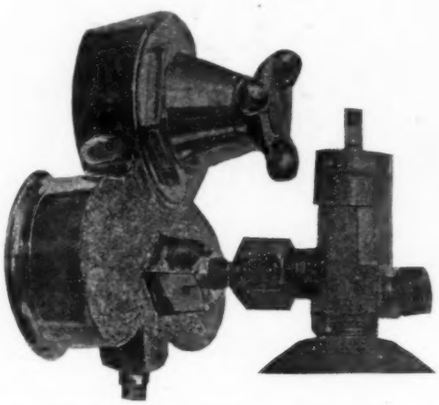
As will be seen by studying the illustrations the principal advantages claimed for this type of apparatus by Mr. Baudet include the following: The pressure regulator and the gauges for oxygen and acetylene are composed of a single casting made of nickel-plated brass. This makes a three-in-one outfit, which not only reduces the wear and tear of the separate regulators and gauges now in general use, but also reduces materially the cost of manufacturing, and consequently the cost of the apparatus to the consumer.

THE THREE-IN-ONE CASTING, COMBINING REGULATOR HIGH AND LOW PRESSURE GAUGES OF THE BAUDET OXY-ACETYLENE TORCH.

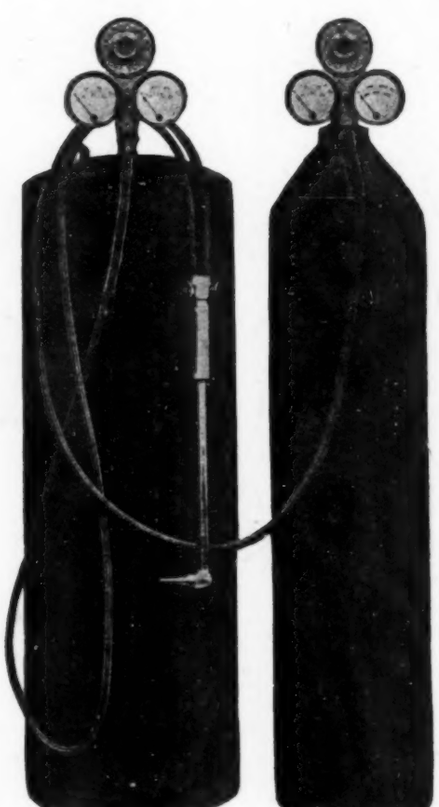
DETAIL VIEW OF THREE-IN-ONE COMBINATION VALVE OF BAUDET THREE-IN-ONE TORCH.

The advantage of having the low and high pressure gauges cast in one piece also is self-evident when it is realized that this makes not only a more durable piece of apparatus, but also makes for safety of the worker from freedom of the leaking of the gases and consequent explosion. The regulator or governor, which is shown at the top of the casting, is designed of a horizontal section, which results in the stopping of all chattering, and gives a steady and even flow of flame to the operator at all times.

Another important improvement embodied in this invention is due to the fact that the apparatus can be used as a cutting and carbon-burning tool, made in a single masterpiece, which not only results in a saving in the cost of manufacture, but also, Mr. Baudet states, gives much more satisfactory results to the user, in addition to being obtainable at a much lower price than is being asked for other types of apparatus. The oxy-acetylene user also has at his disposal a three-in-one piece of apparatus, which may be used for either welding, cutting or carbon-burning. Further particulars of this interesting invention may be had by addressing Mr. Baudet, as above.



REAR VIEW OF BAUDET REGULATOR CONNECTED TO GAS TANK.



THE COMPLETE OUTFIT OF A THREE-IN-ONE BAUDET TORCH.

NATURAL DRAFT OIL CRUCIBLE FURNACE

This furnace is just the ordinary pit furnace, which has for centuries proved to be the most satisfactory way of melting brass. The only difference is that fuel oil is used instead of coal.

The oil is fed automatically to the burner by gravity, and the gases are drawn into the furnaces by the natural draft from the chimney. The crucibles are placed one in each furnace, and the furnaces are arranged one behind the other. The gases enter the first without any pressure, encircle the crucible like wind, and then pass to the second and then to a pre-heater for crucibles.

When the caster desires to remove the crucible, he simply pushes over a lever which closes the vertical passage from the burner to the first furnace, and opens the passage on the other side of the burner to the second furnace. This reverses the gases in the burner, and they pass instantly, without smoke, to the second crucible. This avoids any possible chilling of the second crucible.

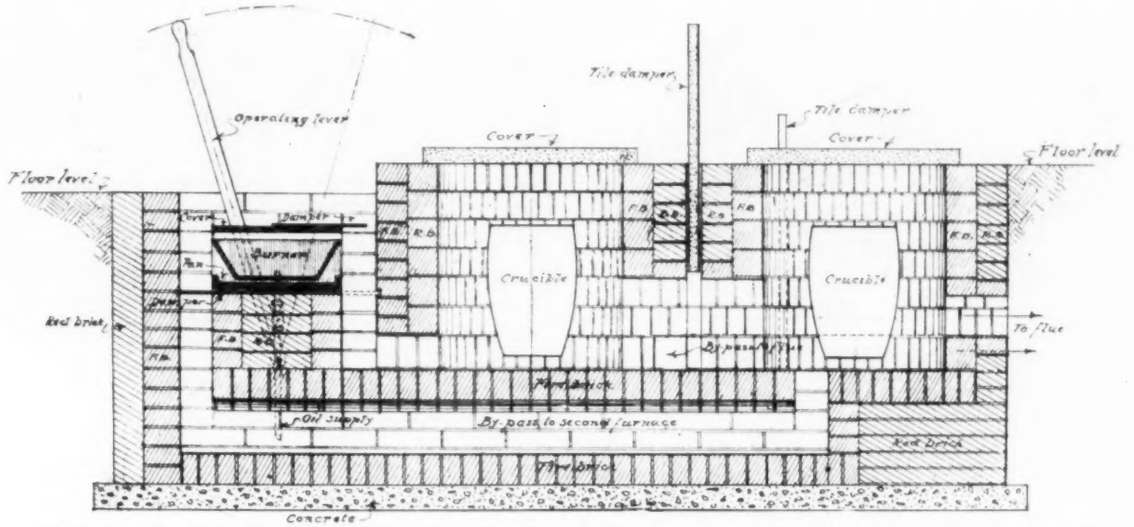
The economy claimed for these burners consists in the waste heat from the first furnace being used to melt the metal in the second furnace. Assuming that 5 per cent. of the heat in the first furnace actually goes into the metal (with coal about 3 per cent. goes into the metal, and the balance goes up the chimney), and there is a radiation loss of 5 per cent., the remaining 90 per cent. is carried to the second crucible, which is more than enough to melt down a second charge.

There is no noise, and as the burner is operated by natural draught, all the gases are drawn into the furnace and not forced into the operating room, and the outside of the furnaces remains cool, and the air is kept pure at all times for the workmen.

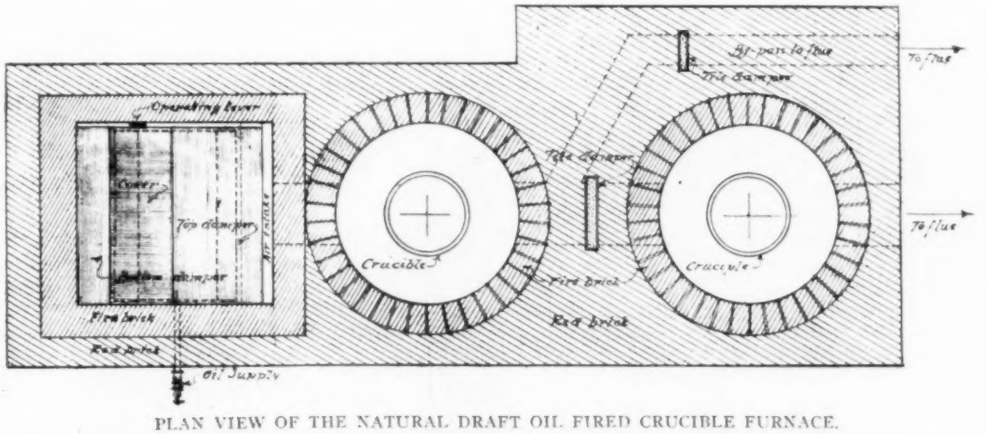
The gases are drawn around the crucibles and not forced against them, impinging on no part, thus giving them an equal expansion and a longer life. The outside of the crucible is absolutely clean and free from carbon, and if one breaks, the metal falls on the hot floor of the furnace from which it can be drawn off, positively free from any impurities. This does away with the expensive recovery of metal from ashes.

Once the furnaces are heated they remain at a constant temperature, no fluctuations are caused by putting on fresh fuel, as is the case with coal and the consequent delay in getting up the metal to the required temperature is avoided. When it is desired to shut the furnaces off there is no waiting for them to burn out, causing an important waste of fuel. The oil is drawn immediately from the burners into a receptacle, and can be again fed to the burners when the fires are again relighted. Doing away with the labor of punching the fires is not one of the least advantages of the burner. The important question of how much heat can be obtained is probably most satisfactorily answered by the fact that this burner is used with unqualified success in melting nickel in quantities from one ton to 25 tons at a charge, and that the crucible furnace has been tried out successfully in the largest New England plants.

The latest improvements, of which Charles R. Kearney, of the Natural Draught Oil Furnace Company, 51 Liberty street, New York, is the inventor and patentee, has done away with all smoke and back firing when charging or removing the crucibles, and the furnace is now simple, practical and economical.



SECTIONAL VIEW OF THE NATURAL DRAFT OIL FIRED CRUCIBLE FURNACE. (NOTE THE DAMPER CONTROL.)



PLAN VIEW OF THE NATURAL DRAFT OIL FIRED CRUCIBLE FURNACE.

RESISTAL SAFETY GOGGLE

By E. F. Hallock.

Something new in the way of a safety goggle which is ideally adapted to the needs of the workman engaged on work where flying particles constitute a hazard to the eyes has just been placed on the market. That the goggle is bound to make an instant appeal to the machinist, welder, glass worker and similar artisan, can be gathered from the fact that while the crystal can be cracked, it cannot be broken even by a hammer blow, while

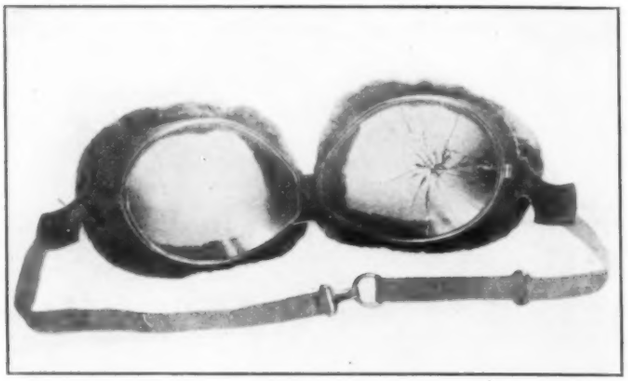


FIG. 1.—GOGGLE FITTED WITH "RESISTAL" CRYSTALS SHOWING ONE OF THE GLASSES BROKEN WITHOUT SPLINTERING OF THE GLASS.

in cracking there is no flying of splinters to jeopardize the eyesight of the wearer.

"Resistal" is the trade name of the glass used in the manufacture of these goggles and its construction is made plain by the accompanying sketch. It comprises two layers of perfect optical glass, which may be either flat or curved, with a layer of celluloid interposed, the whole being welded—not cemented—into a solid mass. The result is a crystal that has every virtue common to ordinary glass with none of its drawbacks or dangers, and it has, moreover, the strength and safety features of the celluloid goggle, but, unlike celluloid, it is absolutely unscratchable, is rigid and perfectly fireproof. Neither is it affected by water, heat or cold, and the celluloid layer provides a heat-insulating medium which effectively prevents "clouding up" due to moisture condensation.

Goggles with "Resistal" crystals are being offered in a variety of forms both for industrial and for motoring use and in either clear, amber or euphos colors by Strauss & Buegeleisen, 37 Warren street, New York City. The firm also stands ready to supply the crystals in special form for use in connection with industrial masks used by welders, sand blast operators, firemen, etc. As a

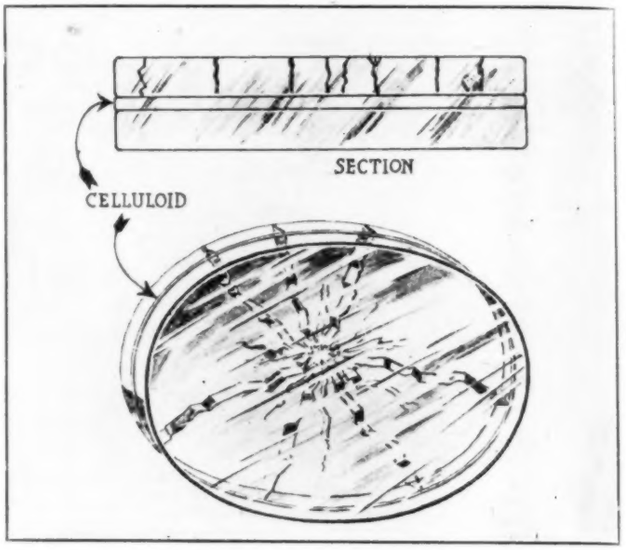


FIG. 2.—SHOWING THE CONSTRUCTION OF THE "RESISTAL" CRYSTAL.

testimonial of their worth is the fact that goggles fitted with the "Resistal" crystals have been adopted for the exclusive use of the Aviation Corps, U. S. Army.

NEW WESTINGHOUSE PLANT

The big plant of the Westinghouse Lamp Company, which was recently erected along the Reading Railway, at Trenton, N. J., adds another new plant to the lines of metal industries in this section. In the manufacture of the Westinghouse lamp considerable brass will be used and the entire product for the fixture will be turned out at the Trenton works. The company has also made provisions for the manufacture of machinery of a special kind at the local plant to be used for lamp making at its other factories. The Trenton works were built by the Stone & Webster Company, of Boston, Mass., at a cost of $500,000.

NEW PLANT OF WESTINGHOUSE LAMP COMPANY AT TRENTON, N. J.

ASSOCIATIONS AND SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

AMERICAN ELECTRO-PLATERS SOCIETY

(AN EDUCATIONAL SOCIETY.)

President, Walter Fraine, Dayton, Ohio; Secretary-Treasurer, Oscar E. Servis, 5305 Warner Ave., Chicago, Ill. All Correspondence should be addressed to the Secretary. The objects of this society are to promote the dissemination of knowledge concerning the art of electro-deposition of metals in all its branches. The Society meets in convention in the spring of each year, subject to the decision of the executive committee. The next convention will be held at Detroit in June or July, 1918. The branch associations hold monthly and semi-monthly meetings in their various cities.

St. Louis Branch—Meets third Saturday of each month at Public Library Assembly Rooms. H. H. Williams, 4156 Botanical Avenue, St. Louis, Mo., secretary.

The August meeting of the St. Louis branch was held at Ebsen's Grove, Belleville, Ill. This is an annual affair, and the main attraction of the afternoon was the swimming pool, after which the lunch baskets were emptied. In the evening the members were entertained with singing by the family of Hugo Eckhardt, of Belleville, Ill., and Miss Deubelbeis. Dancing was also included as part of the evening's entertainment. E. J. Musick, librarian of the branch, has promised some interesting meetings for this fall.

New York Branch—Meets second and fourth Fridays of each month at 32 Union square. Thomas Haddow, president, and W. H. Betz, 67 Covert street, Brooklyn, N. Y., secretary.

The two June meetings were devoted to the convention and the selecting of delegates to the convention. Charles H. Proctor gave some very interesting talks on zinc and tin solutions, while William Voss spoke on rust proofing, and also on the blueing of tools and gun barrels.

The visitors who attended the second meeting of the month were Messrs. T. C. Eichstaedt, who is now connected with the James H. Rhodes & Company, New York; Philip Sievering, Edward W. T. Faint and Merrigold. Mr. Eichstaedt made a few remarks regarding the plating of phonograph records and how the plater plays a very interesting part in the manufacture of same.

EXPOSITION OF CHEMICAL INDUSTRIES

The Third National Exposition of Chemical Industries, which opens on September 24 in the Grand Central Palace, New York, will be the largest exposition of its kind ever held at any place in the world. It will occupy three floors of the Grand Central Palace, and have about 350 exhibitors. The exposition will cover all the ramifications of chemical industry, and men in every branch of industry will find therein the materials and machinery that they are using and can apply in their operations.

This is an exposition for the utmost in efficiency and progress, many of the exhibitors bringing out their most recent improvements for the first time, showing equipment and materials that can reduce cost or increase production in many fields. It is an exposition for many inspirations.

In it there has been arranged a section of exhibits showing the "Southern Opportunity"—the opportunity the South holds for the financier, manufacturer and chemist—these exhibits are being made by many important organizations in the South, and of the more important railroads that are keen upon the development of their industrial possibilities.

A section of exhibits for the "Pulp and Paper Industry," another group of exhibits will have active interest for rubber manufacturers, there are a group for the textile industries, and the American dyestuff industry will be found well represented.

Altogether the exposition is looked forward to by men all over the world, who are writing to the managers, to be an unusual success, and, with the interesting program having many splendid features, bids fair to meet the expectations. Included in the program are some moving picture exhibits, which should prove interesting to readers of THE METAL INDUSTRY. They are as follows:

Monday, September 24. Evening—

Hydraulic Power Development.....(4 reels)
Generation of Electric Power.....(2 reels)
Transmission of Electric Power.....(1 reel)
The Fixation of Atmospheric Nitrogen by Electricity at Niagara Falls, and Feeding the Soil with the Products.....(American Cyanamid Co.—2 reels)

Tuesday, September 25. Evening—

Production of Spelter and Manufacture of Lead Products.
Mining Zinc and Lead Ore in Oklahoma.
Smelting for Lead and Zinc at Joplin and Henrietta.
Production of Sublimed Lead Pigment from the Ore by the Fume Process.
Manufacture of Carbonate of Lead for Paint Pigment.
Manufacture of Lead Paints, accompanied by descriptive discussion. By John R. MacGregor, assistant general sales manager, Eagle-Picher Lead Company.

Thursday, September 27. Evening—

Silver—"The Treasure of the Incas".....(2 reels)
Gold—"The Basis of Business".....(1 reel)

JOURNAL OF INSTITUTE OF METALS

Journal of the Institute of Metals. Volume 17, 1917. Size 5¾ x 8½ inches. 384 pages, including index. Bound in cloth. Edited by G. Shaw Scott, M. Sc., secretary. Published by the Institute of Metals, 36 Victoria street, London, England. Price $5.25 net.

Though the latest issue of the "Journal of the Institute of Metals" would be noteworthy if only on account of its containing five communications of exceptional importance, bearing on as many different phases of metallurgical work, what distinguishes it from any previous volume published by the institute or elsewhere, is the fact that it brings to a focus the very latest ideas, information and criticism with regard to the subject of the melting of the non-ferrous metals—obviously a question of extreme moment in these days of munition making and fuel economy.

In spite of the war, which renders the continued regular publication of such high-class scientific literature as this a matter of some difficulty, the bi-yearly "Journal" appears only very slightly later than usual, while its general appearance and bulk of contents are quite up to pre-war standards, facts upon which the editor on doubt congratulates himself, while the would-be reader who is not a member of the Institute of Metals will be pleased to find that this is one of the few things the price of which—one guinea—remains unaltered in these days of soaring prices. Members of the institute receive the volumes free. Copies of the new volume, for which an unprecedented demand would appear to be not at all unlikely in view of the specially valuable nature of its contents, can be obtained through any bookseller, or direct from the offices of the Institute of Metals.

TRADE NEWS

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS

WATERBURY, CONN.

SEPTEMBER 10, 1917.

War's inroads on the busy industries of the Naugatuck valley are making themselves felt as the September frosts approach, and in the past few days there has been great evidence of the ruthlessness of the draft army orders, as men have one by one dropped out of the ranks of either skilled or unskilled forces in these manufacturing establishments.

For three years, by dint of masterful recruiting, the speed of the brass and copper plants here has been maintained at top pitch, but now the government is taking away men who came here for places to work where better pay could be had than in other places, and the employment problem is again acute for the employer. At present it is the principal problem in the brass and copper industries here, and there are no indications that it can be easily settled.

Barring that the situation is very satisfactory, everything considered—prices still flying high, wages still climbing, freight difficulties still multiplying, fuel problems still expanding. Waterbury optimism is finding ways that were never dreamed of before, and one difficulty after another is surmounted as it appears.

Notable among the illustrations of this fact that might be called from the record of the past three years is the opening of a plant in which to make graphite crucibles, by the Chase Companies, Inc. The crucible industry is to be a part of the Waterbury Manufacturing Company branch of the Chase industries, but it is not believed that it will be developed beyond a point sufficient to take care of the demands of any but the Chase companies for some time. It is just one more industry added to Waterbury's list, and it is the second which the Chase companies have been forced into by the war. Crucibles have been hard to get. Watch crystals were hard to get, so the company, buying them for its output of 16,000 watches per day, decided to make them. It does. The crucibles are to be made for the same reason. That's the Waterbury way.

Business has plowed through the summer season with as little attention to summer conventions as possible. Only the hottest weather forced consideration of the calendar and brief cessation of work in plants where shutdowns of two weeks for overhauling of machinery used to rule. Orders are here to be filled, and there is no evasion of the duty to fill them promptly. Orders not only for government goods and goods that are required in contracts, taken on the understanding that there would be quick delivery, but also orders for "peace" goods have been pressing, and there has been little evidence of slackness in any lines.

Practically every Naugatuck Valley foundry is today enjoying the greatest prosperity in its history. There is not only ample work to be done, but there is such work that it appeals to the pride of the foundrymen, and fine work is the aim and endeavor of every old hand in service, whether he be in the office or "in the heat." Much of the attention of some plants, such as the Manufacturers Foundry Company, has been absorbed by demands for parts of engines for airships and the feverish building of these machines for the United States and its Allies has had its effect here. All foundries have been continually driven with orders for machinery of all kinds, and there appears to be little evidence of a respite. There is current now a rumor of a contract running into the millions which is said to have come to the Waterbury Farrel Foundry & Machine Company, whose business since the spring of 1914 has forced its remarkable expansion from a comparatively small plant into one of the finest in the world and the birthplace of some of the world's most wonderful machinery.

Expansion still continues at the tube and rolling mills of the Chase interests, as well as in their novelty producing plant, while the building program of the Scovill Manufacturing Company also goes steadily forward. Hand in hand with these are the home-building projects of these companies and the American Brass Company, which have created large new villages within the city for their employees who desire to own their own homes. Over 300 homes have been finished in something less than a year and these are being occupied as rapidly as completed. Thousands of dollars spent in the development of these projects have practically been donated to the city of Waterbury, for sewer and water mains have been extended where it could not extend them with municipal money because there had been none provided.

Wage bonuses continue and increase. The regular monthly bonuses are in effect at the Scovill plant, and five-week bonuses have been declared for some 3,000 employees of the Waterbury Clock Company. Various modifications of these plans exist in plants where the bonus system continues, although straight scales are still favored in a majority of places.

Home gardening projects connected with the factory communities seem to have been on the whole successful. One of the leading topics of debate at lunch hour now is the size and quality of the potatoes being harvested from the gardens and the value of "spelter dust" as a fertilizer or bug and pest exterminator.—F. B. F.

BRIDGEPORT, CONN.

SEPTEMBER 10, 1917.

Despite the European war and the entrance into it of the United States, the metal trades in Bridgeport go booming along as they have been doing for the past year or so. As far as can be ascertained by fairly careful observation and inquiry there will be no let-up in any of the various lines of metal industries in Bridgeport because of the levying of men for the draft army. The concerns which are hard hit, and there are a few of them in the city, are and have been making preparations to have other workmen take the place of the skilled men they lose, in this way being able to continue their work without any diminution of output.

As far as large orders are concerned, there may be some floating around the smoke laden atmosphere here but if this is the case they are being rather carefully screened. It is rumored that several of the brass companies have received large orders recently both of government work and also for private individuals but on inquiry these reports would neither be confirmed or denied. The silver companies of the city all state, without a single exception, that they have sufficient work on hand to keep them going, orders already accepted for work in the future, and good prospects of more when that runs out. The silver outlook here is very optimistic.

Brass also holds a niche from which it will be dislodged with great difficulty. Brass companies here in the Park City have been on the boom for some time and from the additions and enlargements being made to many of the factories, a greater boom is expected. It is a well known secret that some of the brass companies are engaged on government work but whether it is the manufacture of shells or not cannot be stated.

There has been effort made for some time to establish a metal workers union here in the city but antagonism has developed and the scheme is still in the air. Labor troubles stir the ripples of the manufacturing pond here from time to time but so far they have been ripples only. The metal workers or rather the polishers at the Remington Arms plant went on strike very recently, but matters have finally been adjusted satisfactorily.

The strike was called in the first place because women were employed in the polishing department and were receiving the same rate as the men. Objections to this were met with refusals of change by the company officials and a walkout went into effect.

Stories were rife about the city for some time that all other

departments of the Arms were to go on sympathetic strike but as the days rolled on these developments failed to put in appearance. Delegations from the polishers went to Washington and appealed to Secretary of War, Baker, to intervene but for reasons non-explainable in print, intervention did not come. The backbone of the strike became weakened and the men started to drift back in ones and twos. Finally the whole strike went skywards and peace and quiet once more reigned supreme. —L. M. P.

HARTFORD, CONN.

SEPTEMBER 10, 1917.

Considerable speculation has been indulged in in Washington over the delay in awarding contracts for machine guns, particularly after the report made by the machine gun board speaking in highest terms of the Browning gun submitted at the tests in Springfield, Mass., by Colt's Patent Fire Arms Manufacturing Company of this city.

In view of the shortage of machine guns in this country, it was thought that the large contracts would be immediately entered into for the new Browning guns, in addition to the orders for Vickers guns and Colt rapid fire guns which had been previously given. For some reason or other greater secrecy was maintained in regard to awarding the contract for rapid fire guns than for other material, but it has been learned that the government has not been delinquent in respect to the manufacture of rapid fire guns, but, on the other hand, has made contracts that may aggregate nearly a hundred million dollars for these weapons.

It is recognized that the two types of Browning guns are superior in every way to guns now being manufactured, and it is said that a contract has been entered into with Colt's Patent Fire Arms Manufacturing Company, of this city, to make 20,000 of these guns. More important than this, announcement of which has been foreshadowed, is the further statement that other arms manufacturers have been licensed by the government to manufacture Browning guns on a contract which involves the payment of royalty in each case to the Colt company. It is stated that the Marlin-Rockwell Company of New Haven has a contract for 20,000 of these guns, rumors of which have recently boomed the price of Marlin stock. It is also reported that the Savage Arms Company, makers of Lewis guns; the Remington U. M. C. Company of Bridgeport and Winchester Arms Company of New Haven have received contracts.

The Marlin Company of New Haven turned out 12,000 of the Colt rapid fire guns for the Russian government under an agreement with the Colt company by which the Marlin company paid a royalty of $100 a gun to the Colt company for the use of its name, the assistance of experts, blue prints, metal formulae, etc.

The royalty to be paid to the Colt company in the present instance is not stated, but under the contracts with the Marlin, Savage, Remington and Winchester companies, manufacture of the new Browning guns royalty will be paid to the Colt company on each gun manufactured, as the company holds all patents on both types of Browning guns.

The date of the first substantial deliveries of Browning guns will not be before late in the winter, but it is known that when the jigs, tools and fixtures have been made these guns can be turned out in large quantities in short order. The Marlin company, it is understood, received approximately $900 a gun for its Russian contract, including separate parts. The price to be paid for the Browning gun has not been stated.

Permits for building additions for the Colt Patent Fire Arms Company, the cost of which will aggregate about $240,000, have been issued by the building inspector. The plans call for two additional stories to the reecntly completed building on Huyshope avenue, 60x500 feet. This addition will total about $200,000. Another story will be added to one of the buildings on the Sequassen street side, also recently completed, at a cost of about $40,000. The additions will be of reinforced concrete construction, the same as the last group of modern factory buildings erected by the company. The additional floors will provide for more polishing space, another assembly room and a drop forging department. It has been announced that a large new boiler house, to cost $150,000, would be built near Sequassen street in the near future. The plans for this building are not yet entirely completed.

The government is negotiating with the Niles-Bement-Pond Company to accept orders for ordnance. This is the company that owns the Pratt & Whitney Company of this city. It is understood that the government is about to close a deal by which the plant of the Niles-Bement-Pond Company at Kearney, N. J., will be used for making of big guns.—P. B. D. S.

PROVIDENCE, R. I.

SEPTEMBER 10, 1917.

Another month has been added to the long period of unusual activity among all lines and branches of the metal industry, and still there are no indications of any cessation. In fact, the indications appear to all to be the opposite as new orders are being daily received. Practically every concern, especially in iron and copper lines, as well as manufacturers of machinery and tools, are being driven to capacity; many are enlarging and extending their plants; and all are seeking additional help.

While the demands of the war are greatly increasing the calls upon all lines of metal industry, still there is also a brisk activity through regular lines, with possibly the exception of building trades demands, which are sluggish at present. Jewelry lines are fairly satisfactory for this time of the year, and reports indicate the expectancy of a good fall and holiday business.

Frederick E. Newell, superintendent of the Newell Brass Foundry, Central Falls, entertained his employes at Oak Bluffs on August 25 and 26. The party left the foundry by automobile trucks belonging to the concern, and made the trip to the Bluffs, returning the next day. Many of the party took the opporunity of enjoying a day's fishing off Martha's Vineyard during the stay.

The R. Plews Manufacturing Company, Central Falls, reports having its trouble at present in trying to fill its orders, owing to the difficulty in securing the materials used in its business. The company is at present engaged in the manufacture of tin colanders and similar metal work, and for several months has found great difficulty in purchasing tin, while such supplies as it has been able to obtain has been at prices which would be considered exorbitant under normal conditions.

The American Emery Wheel Works is building an addition to its plant on Waterman street, this city, that is to be one story high, of brick, 75 by 40 feet. It will be of mill construction with a concrete floor and tar and gravel roof.

Plans have been drawn for an extensive addition to the factory of the Wm. H. Haskell Manufacturing Company, at Main, Pine and Bayley streets, Pawtucket. The addition is to be of brick and of mill construction.

The Central Sheet Metal Works has been awarded the contract for the metal doors and frames, and all the metal work in connection with the addition to the Cranston High School.

Contracts have been awarded for the erection of an addition to the plant of the Potter & Johnston Machine Company at Pawtucket. The main building will be 84 by 290 feet, with two wings each 49 by 141 feet. The structure will be of one story of brick, and the estimated cost is about $65,000.

The Paja Company, a corporation to engage in general engine and machinery business in this city, with a capital of $300,000, received a charter the past month from the Secretary of State under the laws of Rhode Island. The incorporators are Henry C. Hart, Joseph P. Canning and Patrick P. Curran.—W. H. M.

ROCHESTER, N. Y.

SEPTEMBER 10, 1917.

There is practically little or no change in the metal situation in this city during the past month. Business in all of the various metal-using industries is apparently at flood tide, with no outward indications of a let up. Purchasing agents report that certain metals, particularly copper and brass, are to be obtained in greater quantities and prompter shipment, and that prices are lower. In fact copper has sold at a lower figure for some time past.

Manufacturers feel much encouraged at the present situation, as it apparently indicates that the difficulty of obtaining materials

may have been abridged for some time to come. Rail delivery has improved in a marked degree of late, and shippers feel safe in making contracts within the usual guaranteed period.

All of the brass foundries in the city are running full time, and the output is being disposed of without delay. Scrap metal industries are smelting all of the materials delivered in their yards. Much of the pig product is being shipped to Canada. The bulk, however, is being retained here for home consumption. The scrap metal industry is increasing in magnitude each year in Rochester, owing to the large accumulations of junk in the city and country adjacent.

Much speculation is being indulged in as to the effect the new ordnance plant of the Symington Company will have upon the metal interests in Rochester. Work on the big plant is being rushed as fast as men and materials can be brought to University avenue. While steel and sheet iron will form the bulk of metal ingredients used in the making of the 3,000 cannon contracted for by the War Department, brass, copper, bronze and aluminum will form an important feature in the finishing of the ordnance. The breeches and carriages will require a great deal of the more valuable metals, and local warehouses are making preparations to obtain some of the business.

The problem now confronting the manufacturers is whether the new cannon factory will be able to obtain the 5,000 employees said to be required to carry out the government contract. It is said that many farmers and others living out of the city are planning on finding employment in the plant during the winter months. It is feared that some of the skilled mechanics in other local industries may transfer their affections to the new ordnance plant as soon as it gets under way.—G. B. E.

CLEVELAND, OHIO

SEPTEMBER 10, 1917.

The metal situation in Cleveland is marked by a steady decline in the prices of practically all non-ferrous metals. Regarding iron and steel, while prices remain at practically the same levels, supplies seem to be larger and shipments more prompt.

The principal development in the manufacturing field has been practically the taking over of several of Cleveland's 12 automobile plants for the manufacture of aeroplane motors for the new United States air fleet, which, according to Washington, must be rushed to completion and transported to Europe in the shortest possible time. In addition to the automobile plants working on these orders are a large number of foundries and many machine shops.

In order to get better results on large army and aerial contracts at least two important mergers have taken place in Cleveland. One was the merger of the Standard Parts Company and the American Ball Bearing Company through Borton & Borton, financiers. The merger was brought about by an exchange of stocks, according to Walter C. Baker, president of the American Ball Bearing Company. The American Ball Bearing Company is capitalized at $500,000, and has a plant at West Eighty-third street and New York Central tracks. The Standard Parts Company is capitalized at $3,000,000, and has plants at West Seventy-third street and New York Central, Central avenue and East Sixty-fifth, and 2008 East Sixty-fifth street. The merger, according to officials, was principally to enable the plants to handle war orders more expeditiously. The ball bearing company has been making axles for army trucks.

Another merger resulting it is said from war order business is that of the Grant Motor Company, making passenger automobiles, and the Deneen Motor Company, making Denno auto trucks. The announcement was made by F. S. Deneen, who stated that until the completion of a four-story building, for which contracts have been let the trucks will continue to be made in the present plant of the Denneen company at Euclid avenue and East 121st street.

The Grabler Manufacturing Company, 6709 Aetna Road, has filed plans with the city building department for a foundry addition to its plant. The new building will be of concrete, brick and steel, 60x104 feet, one story high, and will cost $25,000. The contract has been let to the Sam W. Emerson Company.

James C. McDermott, of the Baker R. & L. Company, was one of the three Cleveland men winning majors' commissions at the recent Officers' Reserve Camp, just closed at Fort Benjamin Harrison, Ind. He received his early military training with the Cleveland Grays.

Following its merger with the Denneen Motor Co., as above noted, the Grant Motor Car Corporation has awarded contracts for the building to be erected at 12641 Kirby avenue. The first building will be 60x260 feet, and will cost $65,000. Other buildings will be erected later. The W. S. Ferguson Company is engineer, and W. I. Thompson & Son Company general contractors.—C. C. C.

CINCINNATI, OHIO

SEPTEMBER 10, 1917.

Business in all departments of the metal trades remain at a high level in this vicinity, a combination of heavy Government orders and healthy domestic demand furnishing the shops and foundries with about all the work they can conveniently handle. In fact, if a larger supply of the necessary skilled labor were available most of the big concerns, such as the machine-tool shops, would be able to increase their output materially; but the limited supply of labor, which has been accentuated by the demands of the army, has made three-shift working out of the question in most of the plants. Prices for finished machinery are satisfactory, and, in consequence, the foundries are receiving ample pay for their work; but the possibility of heavy taxes on excess profits is exciting some uneasiness among some of the manufacturers, as enormous profits have been earned during the past two years. It is pointed out that these profits furnished much of the incentive for the remarkable extent to which production has been speeded up; but the trade as a whole is ready to do everything in its power to help the Government, and if taxes are imposed, they will be taken care of. The ordinary run of business, outside of Federal orders, direct or indirect, is good, although the copper trade has been severely hit by the legislation directed at the liquor business, which, as anticipated, has virtually eliminated the distillers as purchasers of new equipment, and threatens to have the same effect as to the brewers. However, if munition requirements reach the expected volume, it is believed that many distillery plants will be converted into alcohol producers, which means a heavy investment in new equipment.

A brief strike at the plant of the Eagle-Picher Lead Company, of Cincinnati, in which about 20 men in the metal department walked out, following the refusal of a demand for higher wages, was settled by the concession of an increase of 2½ cents an hour. The men were out for only a day or so, the company deciding on investigation that increased cost of living warranted an increase in pay.

One of the oldest metal concerns in Cincinnati, the J. R. Kinsley Company at 115 E. Sixth street, which had been in business at that location for 40 years, was forced recently to make arrangements for other quarters when the building was condemned by the building commissioner as unsafe. The adjoining building, formerly occupied by a paint house, was virtually destroyed by fire several months ago, weakening the walls of the Kinsley structure. Arrangements are to be made at once for other quarters.

The Amalgamated Brass Company, recently incorporated with a capital stock of $25,000, is a new concern in the trade in Cincinnati. F. M. Cobb, Will B. Sparks, M. F. Henry, R. B. Huyett and Allan W. Mueller are interested.

The Lima Metals Foundry Company, of Lima, O., one of the youngest metal concerns in that section, is busily engaged in making brass parts for use by the East Iron Company in the manufacture of coast-defense gun carriages, and in cartridge making, operating to capacity, with advance orders sufficient to run for several months.—K. C. C.

COLUMBUS, OHIO

SEPTEMBER 10, 1917.

Considerable activity has developed in the metal market in Columbus and central Ohio during the past month. Buying for government purchases has been noted and on the whole there has been a good movement. Uncertainty as to price fixing of

some metals is causing some quietude however and little buying, except what is necessary for the present, is reported. The tone of the market is generally good.

There is a fair demand for both brass and copper and the same is true of babbitt and type metals. Prices have been rather irregular and some show a range of several cents. Aluminum is also in good demand and prices are strong at former levels. Tin and zinc are both fairly strong. There is also a good demand for lead. Shipments are coming out better, as there is little trouble with railroad facilities at present.

The Amalgamated Brass Company, of Cincinnati, has been incorporated with a capital stock of $25,000. The incorporators are F. M. Cobb, Will B. Sparks, M. F. Henry, R. B. Huyett and Allen W. Mueller.

The Barger Sheet Metal Company, of Cleveland, has been incorporated with an authorized capital of $10,000. The incorporators are Sterling Parks, W. L. West, John T. Kimmel, J. F. Merrick and W. C. Pollner.

The John C. Boehm Company, of Cleveland, has been incorporated with a capital stock of $10,000 to make sheet metals. The incorporators are John C. Boehm, Michael J. Boehm, Richard J. Schuergen, A. B. Curtiss and C. M. White.

The Grolbert & Watson Sheet Metal Company has been incorporated with a capital stock of $5,000. It is located at Akron. The incorporators are E. E. Young, C. G. Wise, D. E. Maxon, M. M. Rigle and L. I. Moore.

The Belmont Stamping & Enameling Company, of St. Clairsville has increased its capital stock from $100,000 to $300,000.

The Buckeye Tempered Copper & Brass Company, of Mansfield, has increased its capitalization from $10,000 to $20,000.—J. W. L.

DETROIT, MICH.

SEPTEMBER 10, 1917.

War contracts are still keeping many brass concerns in this city busy. The same also applies to a number of automobile concerns. Among those working on such contracts are reported the Ford Motor Company and the Packard Motor Car Company. The latter company, it is said, having more than a million dollars in contracts for trucks.

While the general brass and copper business seems to be quiet at present outside of business more or less effected by the war, the indications are that conditions are gradually getting back to a more stable condition as the war continues to make progress. The ship-building plants here are pressed with orders for vessels, one Norwegian company having placed heavy orders for ships to be sent to the Atlantic as soon as completed. A large number of lake boats also will be sent to the Atlantic the coming fall, and this also will add to the necessity for the construction of new lake boats, all of which are heavily equipped with brass, copper and aluminum. The Detroit Shipbuilding Company here maintains one of the largest brass foundries in the city. Considerable labor trouble has been experienced at this plant within the last month, but authorities seem to have the trouble well in hand, and rioting has not been serious. Agitators are being arrested and deported.

The Barnes Foundry & Manufacturing Company, a Michigan concern, incorporated for $2,000,000, has started work on the erection of a new plant on a 30-acre tract in River Rouge, a suburb of Detroit. This company will specialize in cylinder and piston castings for the motor car industry, and in addition will make gray iron castings. It is said the foundry will be in operation this winter. The plant lies on the Michigan Central, the Pennsylvania, and the Detroit, Toledo and Ironton railways, and has excellent facilities for shipping.

Harry Brothers Manufacturing Company is now located at 282-292 Woodbridge street East, and is known as successor to the Voelkner & Harry Manufacturing Company. This company, besides manufacturing a large line of copper and brass specialties, also maintains a department devoted to japanning, a feature being white enameling. They also have a complete electro-plating equipment, and have added many modern devices for facilitating work on contracts. They cater to a large number of Detroit manufacturing concerns.

Brass, copper and aluminum plants in all parts of the city report transportation facilities greatly improved, and anticipate no great handicap during the coming winter such as troubled them a year ago.

Manufacturing jewelers also report good orders for fall delivery, and as a rule say the war has had no great effect on their business. Manufacturers here are producing great quantities of stick pins, and also college fraternity jewelry.

Manufacturers of plumbing and builders' hardware report their lines quiet, and see no great prospect of improvement this fall.—F. J. H.

ST. LOUIS, MO.

SEPTEMBER 10, 1917.

Job plating shops of St. Louis employing union labor were closed August 14, 15 and 16, the members of Local No. 13 of the Metal Polishers, Buffers, Platers, Brass and Silver Workers' Union having been called out as a means of forcing their demands made upon the members of the St. Louis Platers' Association, which includes 20 of the job shops of St. Louis, for an increase in wages of 25 per cent. for all of the principles of a closed shop, and an allowance of 10 minutes at noon and 10 minutes in the evening in which to wash up. The men won their point for a 25 per cent. increase, but the other features of their demands were not granted. The association had been served on July 1 with notices of the union's demands, which were to become effective on August 1. The association had the matter under consideration, and then decided to grant an increase of 10 per cent. to antedate the period set by the men by one day, but declined to make any further concessions. The men worked 11 days under the new schedule of 10 per cent. increase, and it then was thought that the matter had been settled. But on August 11 the original demands were renewed, resulting finally in a walkout and settlement, as above stated.

The various job plating works are all busy, and the prospects for fall business are generally regarded as being very favorable. Prices have been advanced 25 per cent. to meet the increased cost of labor, but even with this advance there is still a small margin of profit because of the steadily increasing costs of chemicals and other materials needed by the platers. The Musick's Plating Works, 915 Chestnut street, and the Electro Depositing and Manufacturing Company, 2208 Washington street, both are quite busy on government contracts.

The St. Louis Brass Manufacturing Company, Jefferson and Washington avenues, has declined to unionize its shop in the fulfillment of its $60,000 contract to supply the lighting fixtures in Missouri's new capitol at Jefferson City. No heed was paid to the demands of the union, and the Brass Manufacturing Company is now going ahead with the contract.

Within the last week there was a goodly increase in both shipments and receipts of lead at St. Louis. This was due to heavier loading and a somewhat more plentiful supply of cars. Virtually nothing is on sale for spot delivery. Sales reported during the week were from $10.65 to $10.75 per 100 pounds, f. o. b. St. Louis. Spelter continues absolutely dead and featureless. So far as could be learned no sales were consummated, and inquiries are scarce. The principal consumers seem to be well covered by contract, and producers are not pressing matters in view of expected demands from the government. Nominally the market ranged from $8 to $8.25 per 100 pounds. Receipts for the week ending August 25 were 105,990 pigs of lead and 207,530 slabs of zinc, while shipments were 74,000 pigs of lead and 141,260 slabs of zinc.

Elmer E. Sattler, president and general manager of the Belleville Stove and Range Company, has passed the physical test for the new National Army, and has made no claim for exemption. His concern employs several hundred men, and now is turning out a larger order for army cook stoves.

Announcement has been made that the Parker Rust-Proof Company of America, with headquarters in Detroit, Mich., has selected St. Louis as one of the twenty-six cities in which they will build a branch plant. Work will be started as soon as the company gets the New York and Chicago branches well under way, which it is expected will be within a comparatively brief period. "St. Louis is a good, live commercial city, with unexcelled railroad facilities, and it is ideally situated for big things in rust proofing," said Clark W. Parker, president of the company, in discussing the selection of St. Louis as a location for an additional plant. "As an evidence of this, St.

Louis has the only absolutely rust-proof building in the world. That is the Bevo plant, in which every piece of exposed steel has been Parker processed."

Three St. Louis manufacturing plants—the National Enameling & Stamping Company, the Crunden Martin Manufacturing Company and the Standard Stamping Company—have joined with thirty manufacturers of enameled, galvanized and tinned wares from all parts of the country in an appeal to housewives to prolong the life of their kitchen utensils. It is stated that this step is taken because of the demand for steel and the shortage of other materials used in these products because of the war. The war has greatly stimulated the use of enameled, galvanized and tinned wares.—R. M. E.

TRENTON, N. J.

SEPTEMBER 10, 1917.

The State of New Jersey in erecting buildings is now using bronze and brass hardware instead of iron and steel, claiming that the latter would soon rust out. Francis H. Bent, State architect, said: "It is the custom of this office in erecting State buildings to provide material that will stand use. We find that bronze hardware, although a little more expensive than iron, is the only kind of material to use." There was a dispute in awarding the contract for the erection of the Bordentown Training School, because the bronze hardware cost about $100 more than iron. The State then announced that solid bronze and brass would be used in the future.

The big Government orders for pottery ware for the army cantonments, which were placed with the local potteries, are of big importance to manufacturers of brass and other metal fixtures necessary for the installation of the tanks and closets, and the manufacturers of these fixtures are also giving preference to the Government work. Considerable of these metal fixtures are being turned out by the Trenton Brass & Machine Company, Billingham Brass & Machine Company and other Trenton concerns. In view of the big demand for brass and copper hardware the International Loading Company, of Jersey City, was recently incorporated here to manufacture and sell hardware, machines, tools, etc. The new company has a capital stock of $1,500,000 and the incorporators are Arthur W. Britton, Samuel B. Howard and George V. Reilly, all of Jersey City.

Business remains good at the Trenton metal plants and no cessation is expected during the coming fall and winter. The Trenton Malleable Iron Company is working on an order for brass castings, while the Trenton Brass & Machine Company is manufacturing a number of special articles in brass. The McFarland Foundry & Machine Company is very busy in its foundry department, while brass and bronze castings are being turned out in large numbers. The Clifford Novelty Works is working on a big order for sheet metal articles and sheet metal tools.

Local casting shops have been handling a fair percentage of pattern work for manufacturers of farm implements who, on account of the war and the labor scarcity, have been working overtime in efforts to perfect tractors and other labor-saving farm implements.

The four-story plant of the Electrolytic Art Metal Company has been sold to a tobacco concern following the failure of the former concern. The Skillman Hardware Manufacturing Company has received some new orders for hardware from the western states and the company is now busy.

The Bordentown plant of the Standard Fuse Corporation is still closed with the exception of a few machinists and it is not known if it will ever operate as a fuse plant again. The employes have been told to secure positions elsewhere. Many of the employes quit good positions to accept jobs there, believing that the work would last for several years.

Charles W. S. Munro, president and manager of the Trenton Smelting and Refining Company, has put into effect recently a plan that will eliminate the bad odors which come from the industry and which were complained of to Commissioner of Labor Lewis T. Bryant and to the Mercer County Central Labor Union. Commissioner Bryant sent a letter to Mr. Munro and the latter promised to abate the nuisance as much as he possibly could. The complaint was made by employes of nearby plants.—C. A. L.

LOUISVILLE, KY.

SEPTEMBER 10, 1917.

The food control bill going into effect put all of the distilleries of Kentucky and surrounding districts out of running, and stopped what repair work the local coppersmiths had been obtaining from the liquor industry. At the present time there is small chance of there being a revival of distilling until the close of the war, and that may be a long way off. However, local coppersmiths in many cases do not believe that the food control bill will result in national prohibition, and believe that eventually distilling will be resumed.

While the food control bill makes it impossible to use grain in manufacturing beverage liquors, it does not prohibit the use of grain in alcohol, something that is much needed in manufacturing high explosive, drugs, chemicals, etc., and with a good corn crop and lower prices, there is a strong chance that a large number of Kentucky distilleries will be remodeled and go into alcohol manufacturing. Shortly after the outbreak of the European war a number of distilleries in Kentucky were equipped for such manufacturing, and others would have done so except for the fact that they would have had to change back to make regular crop runs. With no chance to make annual crop runs of whiskey the chances are that the copper workers will be called upon to do much remodeling, which will enable the distillers to make use of their investments during the life of the war.

Local coppermen claim that market quotations and actual prices on copper requirements are entirely different things at this time. The market is demoralized, and many people are of the opinion that the Government will set prices as has been the case on other commodities. Therefore the feeling has caused the market to work down, but in buying actual requirements from the mines or jobbers it is found that the actual market is generally a bit higher than the quotations. For instance, ingot copper is quoted at 24 cents, but mine quotations are 27@27½ cents. Sheet copper from a base price is worth 36 cents a pound, and tubes 44 cents. Heavy scrap copper is worth locally 23 cents, and brass 12 cents. Stocks of scrap metal in the hands of the junkers and coppersmiths are generally low, the junkers disposing of metal as fast as it is received rather than take a chance on a drop from present high markets, while the coppersmiths have been buying light for immediate consumption only.

The brass shop at the Louisville & Nashville R. R. Company's shop has been as busy as a beehive for several months past, and for the first time in several years the company has been operating the entire shops full time around the entire calendar. During the past year the car shortage has been such and tonnage so heavy that every car the company owns has been operating, while hundreds of new ones have been built outright in the local shops. Repairs have been heavy, and casting of journal brasses, babbitt linings, air line valves, couplings, etc., has been very heavy.

The Vendome Copper & Brass Works has managed to keep fairly busy by going out and getting new lines of work to take up business lost with the distilling industry placed on the hammer. Copper working concerns are beginning to figure on work that heretofore they had not considered worth while. A general reorganization of the industry is bound to take place locally.

With the Independent Brass Works business continues good, the company getting a good run of special elevator casting work, some pattern work, and also a fair volume of special casting work for the C. Lee Cook Manufacturing Company, manufacturers of metallic packing rings, special marine bearings, etc.

J. W. Oliver, manager of the Ahrens & Ott Manufacturing Company, manufacturers and large jobbers of plumbing supplies, including brass goods of all kinds, has been named president of the Louisville Board of Trade, succeeding F. N. Sackett, who retired to become Federal Food Commissioner of Kentucky. Mr. Oliver has been vice-president of the board and is familiar with every detail of the work.

Very heavy deliveries of plumbing supplies have been made locally in connection with the completion of the Federal cantonment, Camp Taylor, at Louisville. The plumbing work on the camp ran to over a half million dollars, it being handled jointly by the Louisville Master Plumbers' Association, P. H. Meyer and H. J. Scherich, the association furnishing the labor required. Thousands and thousands of dollars' worth of metal goods were required.—O. V. N. S.

NEWS OF THE METAL INDUSTRY GATHERED FROM SCATTERED SOURCES

The Driver-Harris Company, Harrison, N. J., is building a one-story foundry at an estimated cost of $25,000.

The A. W. Wheaton Brass Works, manufacturers of brass goods, Newark, N. J., is about ready to start a brass foundry.

The Wilcox Crittenden Company, 8 South Main street, Middletown, Conn., is erecting a one-story, 40x90 feet brass foundry.

The Syracuse Smelting Works, manufacturers of type metals, Brooklyn, N. Y., has just completed the installation of two additional furnaces.

The General Electric Company, Schenectady, N. Y., will build a new one-story addition to its foundry at Pittsfield, Mass., and which will be 100 x 110 feet.

White & Brother, Inc., smelters and refiners, Philadelphia, Pa., have opened an office at 821 Trinity Building, 111 Broadway, New York, in charge of C. G. Dickinson.

The Edward L. Sibley Manufacturing Company, manufacturers of brass goods, Bennington, Vt., has awarded a contract for a factory, 60x157 feet, one story.

The Edward Valve & Manufacturing Company, Chicago, Ill., manufacturers of plumbers' supplies, is building an 80x160-foot forge shop and a foundry 80x140 feet.

The Taunton-New Bedford Copper Company, Taunton, Mass., has awarded the contract for the construction of a new one-story machine shop, about 60 x 100 feet, to cost $10,000.

The Morton Company, Muskegon, Mich., reports that there is no ground for the published report that it is planning to build a foundry for manufacturing its own castings.

A one-story, 100 x 160 feet, billet mill and a hoop mill, 45 x 260 feet, with a wing 55 x 60 feet, one story, is being added to the plant of the Stanley Works, New Britain, Conn.

Plans are being completed for a factory, 70x236 feet, for the Triangle Motor Truck Company, St. Johns, Mich., and it is expected that it will be completed about November 1.

The Lunkenheimer Company, Cincinnati, Ohio, announce that it is not planning to erect an addition to its brass foundry, as was reported, but that they are planning to build an addition to the manufacturing department.

The Morris Machine Works, East Genesee street, Baldwinsville, N. Y., is building an addition to its plant. The company operates a brass, bronze and aluminum foundry, brass machine shop and tool and grinding room.

J. Wiss & Sons Company, 31 Littleton avenue, Newark, N. J., manufacturers of razors and shears, is taking bids for the construction of a two-story, 25x45-foot building, with a one-story addition 20x15 feet, to cost about $10,000.

Titanium Bronze Company, Niagara Falls, N. Y. Capital $500,000. This company was incorporated to take over the bronze department formerly operated by the Titanium Alloy Manufacturing Company, Niagara Falls, N. Y.

The Waterbury Manufacturing Company, manufacturers of brass goods, Waterbury, Conn., is building a six-story addition to its plant at an estimated cost of $100,000. The building is to replace one that it has become advisable to remove.

The Hanson & Van Winkle Company, 269 Oliver street, Newark, N. J., manufacturer of dynamos and platers supplies and equipment, has awarded the contract for the construction of an extension to its plant at Adams and Chestnut streets.

The Fields & Lee Foundry, Anniston, Ala., has been started for the manufacture of brass and aluminum castings. The owners and operators, Messrs. Field and Lee, formerly conducted a similar foundry at Thomasville, Ga., but recently disposed of same.

The Canadian Fasteners, Ltd., Hamilton, Ont., Canada, recently incorporated to manufacture fasteners, hooks, etc., is planning to erect a concrete and brick factory to cost $30,000. The company operates a tool room, plating, japanning and stamping departments.

The Belden Manufacturing Company, 2300 Southwestern avenue, Chicago, manufacturers of insulated wires, has awarded the contract for a one-story, 92x127 feet factory on West Van Buren street. This is the first unit of the plant, which will cost when completed $250,000.

The Franklin Institute has awarded its Edward Longstreth Medal of Merit to Frank H. Schoenfuss and Albert Kingland for the invention of the Portable Brinnel Meter, which is manufactured under sole license agreement by Herman A. Holz, 5 Madison avenue, New York.

J. N. Battenfeld, of the U. S. Molding Machine Company, manufacturers of foundry molding equipment, Cleveland, Ohio, reports that the published announcement that his company is to build an addition to its plant is an error, as they are not contemplating any addition at the present time.

J. R. Wood & Sons, 1325 Atlantic avenue, Brooklyn, N. Y., manufacturing jewelers, will build a new five-story plant, about 80x134 feet, to cost about $75,000, and which will have the following departments: Melting, welding, rolling, drawing, press, embossing, jewelry, polishing, coloring and enameling.

The common stock of the Standard Brass & Copper Tube Company, New London, Conn., has been acquired by the Bridgeport Brass Company, and the preferred stock has been retired. The plant is being increased, and will be run as a department of the Bridgeport Brass Company, Bridgeport, Conn.

A one-story addition, 65x132 feet, is being built by the Fulton-Harwood Brass Foundry Company, 1508 South William street, South Bend, Ind., to its present foundry. The company operates a brass, bronze and aluminum foundry and grinding room, and is in the market for foundry and core room equipment.

Because of the condition of the building business the Solar Metal Products, Columbus, Ohio, which has been making metal doors and partitions exclusively, is branching out into the manufacture of various metal stampings, draw press work, draw bench work and turnings, and is adding a large amount of new equipment.

Einar Owren has resigned his position as superintendent of the Reed & Barton foundry, Taunton, Mass., which he held for over sixteen years, and will engage in the foundry business at 311 Eddy street, Providence, R. I. Besides handling French sand, Mr. Owren also intends to conduct a general brass, bronze and aluminum foundry.

The McCarty Drill & Tool Corporation, of Toledo, Ohio, with executive offices at 30 Church street, New York, N. Y., has purchased the Toledo Drill & Tool Company, which has just moved into a new and enlarged fireproof two-story structure where they have arranged to turn out large quantities of high-speed drills in addition to a full line of cutters and reamers.

Lehman Brothers, scrap metal dealers, Fourth and Jefferson streets, Hoboken, N. J., have moved from their old building, which they have occupied for about 15 years, to a five-story brick structure on the opposite corner. In their new location they have excellent facilities for handling scrap of all kinds,

and they are also well equipped for turning out ingot metals of all descriptions.

The Light Manufacturing & Foundry Company, Pottstown, Pa., manufacturers of aluminum specialties of various kinds, is taking bids for the construction of a new two-story and basement addition to its plant, about 30x50 feet. The company will also make improvements in its foundry. The company operates a brass and aluminum foundry, brass machine shop and tool and grinding rooms.

W. A. Layman, president of the Wagner Electric Manufacturing Company, St. Louis, Mo., announced on his return from Washington that his company had signed a contract with the Ordnance Department of the Government to manufacture half of a $12,000,000 order for 1,000 4-inch guns to arm merchantmen and army transports, as well as a $3,000,000 order for 8-inch shells for the United States.

The Howard Metal Company, Second and Canal streets, Reading, Pa., brass founders, are very busy on war orders such as manganese bronze castings for use on artillery mounts. Also aluminum castings such as crank cases for aeroplane motors for the Curtiss Aeroplane Company, of Buffalo, N. Y. The company operates a brass, bronze and aluminum foundry and casting shop and is in the market for a device for cutting off gates and risers on aluminum crank cases.

The St. Louis Post-Dispatch, St. Louis, Mo., now is in their beautiful new building at Twelfth and Olive streets. Among the contracts were: Sheet metal, J. Eberle & Son, St. Louis; bronze work, A. E. Coleman & Company, Chicago, mail chute, Lasar Manufacturing Company, St. Louis; electric motors, Sprague Electric Company, St. Louis; lighting fixtures, St. Louis Brass Manufacturing Company, and special lighting fixtures, Cross Chandelier Company, St. Louis.

The Baltimore Copper, Smelting & Rolling Company, branch office, sheet copper department, is now located in its new building at 128-130 Fourth avenue. They will carry in their new warehouse the products of the American Smelting & Refining Company, including Ingot copper, pig tin, lead and spelter. Also a full line of sheet copper, copper rolls, flats and anodes will be carried in stock, as heretofore. George Giffault, formerly with Fritz, Dana & Brown, has become associated with the sale of metals at retail.

The Ohio Blower Company, Cleveland, Ohio, is now occupying its new building, which was recently completed at a cost of $150,000. The company reports that their exhibit at the Foundrymen's convention in Boston, Mass., September 24 to 28, will cover a dust collecting system for removing dust from buffing, polishing, emery and grinding wheels, covering a direct connected exhaust fan and motor dust collector, piping and elbows and various designs of hoods. Also a two-section shower bath for foundry and factory use.

On July 5, 1917, the Two Rivers Plating Works of Two Rivers, Wis., was reorganized and succeeded by the Two Rivers Plating & Manufacturing Company, at which time the entire capital of $40,000 was paid in, and the control passed out of the hands of the former owners, and new officers and stockholders were elected. The Two Rivers Plating & Manufacturing Company is equipped to do all kinds of plating as well as galvanizing, tinning, japanning and lacquering. A great deal of new equipment has been added, and also an addition to the factory.

Among the prominent exhibitors who have engaged space in the National Exposition of Chemical Industries, which will be held in the Grand Central Palace, New York, during the week of September 24, is the Solvay Process Company, of Syracuse, N. Y., the largest producers of alkali products in the country. This progressive concern will occupy booths 11 and 12, where representatives will show samples of the numerous forms of alkali, and distribute valuable literature on the subject to all who are interested in the production and application of alkali.

The plant of the Apollo Metal Works, manufacturers of plated sheet metals, at La Salle, Ill., was completely destroyed by a fire of unknown origin during the night of August 9. The company announces that they are planning to rebuild in a larger way, and will take advantage of the opportunity to install a complete equipment of special machinery designed for the production of nickeled zinc, copper zinc, brass zinc, nickeled tin plate, copper tin plate, brass tin plate, oxidized tin plate and polished zinc. A complete stamping plant for the manufacture of specialties will also be installed.

The Monarch Engineering & Manufacturing Company, Baltimore, Md., will have on display at its booths Nos. 112 and 114 at the exhibition of the American Foundrymen's Association which is to be held at Boston, Mass., September 24 to 28, 1917, the following equipment: Monarch furnaces with and without crucibles (oil, gas, coke or coal), "Simplex," "Reverberatory," double chamber, crucible-soft metal, cynaide, barium, chloride, heat treating, annealing, hardening rivet forge, pumps, blowers, core ovens. Special brass melting furnaces for yellow brass without crucibles, burnng soft coal, coke or powdered coal or anthracite mold dryers, cupola lighters, ladle heaters.

It is understood that the American Brass Company, Waterbury, Conn., paid about $2,500,000 for the plant of the Buffalo Copper & Brass Rolling Mill, Buffalo, N. Y., recently acquired. Over 50 per cent. of the Buffalo stock is owned by the Electric Auto-Lite Corporation, which is in turn controlled by John N. Willys, head of the Willys-Overland Company. The Electric Auto-Lite Company has just been financed by the National City Company. When the Buffalo Copper & Brass Company is liquidated the Electric Auto-Lite Company will receive over $1,300,000 cash for its holdings, in addition to more than 50 per cent. of the stock of the Bridgeport Crucible Company, which is at present earning at the rate of $1,800,000 net a year.

The latest innovation introduced in the Brooklyn plant of the Syracuse Smelting Works is a "seventh inning stretch." At 3:15 each afternoon the telephone operator rings a signal and all work stops. For the next 15 minutes desks are deserted, typewriters and bookkeeping machines are silent, dictaphones are shut off, and everybody from the president of the company to the office boys enjoy a recess. The idea of a 15-minute recess each afternoon was suggested by an officer of the company, who realizes that in order to get the best possible work from their employees, neither body nor brain shall be overworked. Employees working under considerate conditions take pride in their work, an intimate interest in the success of the company, and find the road to advancement made easier for them.

The National Bureau of Standards has not yet obtained all the men needed to fill metallurgical positions with salaries varying from $1,200 to $2,000, depending upon the training and experience of the candidate. Men are desired with experience either in ferrous or non-ferrous metallurgy. The duties in such positions will be almost entirely of an investigational nature, in connection with problems of military importance. Qualified men are urged to communicate to the Bureau of Standards, Washington, D. C., at once a statement of training and experience, names of references and minimum salary which would be accepted, so that they may be advised of appropriate civil service examination for which to file papers. Until further notice such papers are received by the Civil Service Commission at any time and rated promptly.

DISSOLUTION

A final certificate of dissolution of the United German Silver Company, of Stamford, Conn., was recently recorded at the office of the Secretary of State and title to all the assets of the company has been transferred to the Stamford Rolling Mills Company, Stamford, Conn.

REMOVALS

The Crucible Company of New Jersey have moved their main office from Perth Amboy, N. J., to 120 Liberty street, New York.

The San Francisco, Cal., office of the Celluloid Zapon Com-

pany has been moved from 406 South Main street to 1009 South Fignerva street.

The Charles Skidd Manufacturing Company, Kenosha, has removed its works and offices to Janesville, Wis., where it has purchased a four-story brick building from the Wisconsin Carriage Company. The company manufactures dairy machinery, etc., and operates a brass machine shop, tool room, cutting-up shop, spinning, stamping, brazing, tinning, soldering and polishing departments.

INCREASE IN CAPITAL STOCK

The United Smelting & Aluminum Company, New Haven, Conn., has increased its capital stock to $400,000.

The Estate Stove Company, Hamilton, Ohio, has increased its capital stock from $550,000 to $825,000, but does not expect to build at the present time, as was reported.

The Buckeye Tempered Copper & Brass Company, Mansfield, Ohio, has increased its capital stock from $10,000 to $20,000. The company operates a brass and bronze foundry.

The Stamford Rolling Mills Company, 25 Broad Street, New York, operating plants at Stamford and Springdale, Conn., for the production of rolled plate and cast brass and copper, has increased its capital from $2,835,000 to $3,625,000.

The Simmons Company, Kenosha, Wis., has increased its capital from $8,000,000 to $10,000,000. The company manufactures brass beds and operates the following departments for its own use only—brass foundry, tool room, rolling mill, stamping, galvanizing, plating, polishing, japanning and lacquering.

U. S. WANTS INSPECTORS OF ORDNANCE EQUIPMENT

An examination for inspectors of ordnance equiment has been announced by the Civil Service Commission, according to a notice received from the Chief of Ordnance of the War Department Division. One class of this examination is for inspectors of hardware and metal equipment, comprising such articles as buckles, rings, fasteners, hand axes, wire cutters, intrenching tools, canteens, cups, meat cans, cutlery and other small articles of brass, iron, steel or aluminum.

Men who have had a high school or equivalent education, and in addition have had four years' experience in a manufacturing plant making such articles as those described above will qualify for one class of inspectors—another class of inspectors requires men over 25 years of age who are graduates from a college or university of recognized standing, and who have had one year's experience in a manufacturing plant on the practical end of the work.

The duties of inspectors will consist in the organization and supervision of the inspection work in plants where equipment as described above is being manufactured. They will also be responsible for the preparation of the necessary reports covering the inspection, shipment and payment for the articles described.

The positions will be civil service appointments, and the salaries will range from $1,200 to $2,400 per year, with additional allowance for traveling expenses.

Those who are interested can obtain additional information from the Equipment Division, Inspection Section, 1330 F street, N. W., Washington, D. C., or from any office of the United States Civil Service Commission.

INQUIRIES AND OPPORTUNITIES

Under the directory of "Trade Wants" (published each month in the rear advertising pages), will be found a number of inquiries and opportunities which, if followed up, are a means of securing business. Our "Trade Want Directory" fills wants of all kinds, assists in the buying and selling of metals, machinery, foundry and platers' supplies, procures positions and secures capable assistants. See Want Ad. pages.

PRINTED MATTER

Sand Blast Machines.—Catalog F, 1917, has been issued by the Hoevel Manufacturing Company, 30 Church street, New York. The catalog contains 16 pages, and gives illustrations and complete descriptions of the numerous types of sand blast machines manufactured by this company.

Grinding and Polishing Machinery.—The Webster & Perks Tool Company, Springfield, Ohio, has issued a loose-leaf catalog, which fully illustrates and describes their complete line of grinding and polishing machinery and accessories, comprising plain and ring-oiling bearing, ball bearing and direct connected electrically driven types. Complete specifications are included for all of these various types of machines.

Fire Prevention.—The National Board of Fire Underwriters, New York, have prepared for the Council of National Defense a booklet on the prevention of fire under the title of "Safeguarding Industry," together with a show-card of fire prevention rules for employees. W. E. Mallalieu, general manager, states that these booklets are being mailed to a list of 66,000 leading manufacturers of the United States, and in case anyone should be overlooked he will be glad to forward a copy upon receipt of request to him at 76 William street, New York.

Universal Safety.—The National Safety Council, Chicago, Ill., which is holding its Sixth Annual Safety Congress in New York at the present time, viz.: September 11 to 14, 1917, has issued a very comprehensive booklet as the program of the congress. The scope of the work of the safety council covers practically every form of industry, and comprises two general sessions, one for presidents and managers and the other for young safety engineers. There is also a general round table meeting, 16 sectional meetings and the National Safety Exposition of various types of safety first appliances.

Talks to Platers.—A booklet of eighty-two pages has been published by the Bridgeport branch of the American Electro-Platers' Society, with the title of "Talks to Platers." These talks were gven before the branch at their various meetings by F. C. Stanley, Ph. D., during the past year. The matter contained in this booklet will be found very valuable to electroplaters in general as the information is set forth in a simple and direct manner, and completely covers the ground in reference to the make-up of nickel and copper plating solutions; together with talks on the cleaning of metals and analyses of solutions. The Bridgeport branch is offering this booklet for sale at 50 cents each, and copies may be obtained by addressing Royal F. Clark, secretary-treasurer, P. O. Box 671, Bridgeport, Conn.

Wires and Cables.—The General Electric Company, Schenectady, N. Y., has issued a loose-leaf catalog made up of several bulletins, which are devoted to descriptions of a general line of wires and cables, including varnished cambric and paper insulated cables. Separate copies of the various bulletins making up the catalog may be had upon request. The General Electric Company has also issued a very extensive index to supply parts bulletins. This index covers the bulletins issued by this company from time to time and includes those relating to air brake equipment, circuit breakers, compensators, compressors, contactors, controllers, control apparatus, drills, electric rock type, electric fans, gas-electric motor car, renewal parts, generators, governors, headlight, lamp arc, motors of all types, continuous current and induction, motor-generator sets, reels, cable, cable motor driven, renewal parts and supplies, relays, rheostats, switches and watt hour meters. Copies of this valuable index may be had upon request.

CATALOG EXHIBIT

An exhibition of every kind of catalog may be seen at The Metal Industry office, 99 John street, New York. The Metal Industry is prepared to do all of the work necessary for the making of catalogs, pamphlets, circulars and other printed matter. Estimates will be furnished for writing descriptions, making engravings, printing, binding, for the entire job from beginning to end or any part of it.

METAL MARKET REVIEW

WRITTEN FOR THE METAL INDUSTRY BY W. T. PARTRIDGE.

SEPTEMBER 10, 1917.

COPPER.

Because of the uncertainty existing in regard to government price fixing, all metal industries were unsettled more or less during August, but copper seemed to be even more afflicted than others, with business practically at a standstill, and prices largely nominal.

Labor disturbances continued to harass the industry, for no sooner had the trouble at the Lakes and in Alaska been adjusted, than fresh difficulties were reported at Butte. At the close of the month Lake copper was held at 27 to 28c; electrolytic, 25.50 to 26c.; casting, 25 to 36c.; October electrolytic, 25.00 to 25.50; November, 24.50 to 25c., and fourth quarter, 24 to 25c., the decline being 3c. per pound during the month.

TIN.

Tin trading during August was retarded by delayed cables from London, due to the censorship now in force on both sides of the Atlantic. The market opened with an advance of ¼ to 64c. from the July closing, but the amount of business transacted was small in volume. Banca and No. 1 Chinese brands, however, were in active demand, the former at 61c. and the latter at 55c. To the acuteness of the ocean freight situation and the shipping regulations was attributed a recession of ⅜c. a few days later for Straits, with Banca down 1 cent to 60 cents, and No. 1 Chinese to 54.50 cents. Immediately following there were fluctuations within a fractional range, the lowest point being reached on August 24, at 61.50 cents, a net recession of 2.50 cents for the month on spot Straits. Total arrivals at Atlantic ports were 2,520 tons. The foreign market fluctuated within a range of £7 to £8 from £248 10s. for spot Straits; £247 10s. for spot standard; £243 10s. for future standard, August 1 to £245 for Straits; £244 c. i. f. London from the East Indies; £244 10s. for spot standard and £243 5s. per futures, at the close.

SPELTER.

The spelter industry during August was dull, even for this usually dull period of the year. The month opened with nominal quotations, 8.67½ cents New York and 8.50 cents East St. Louis, for all positions except fourth quarter, which ranged fractionally higher to 8.67½ to 8.80 cents New York. The Government asked bids on 11,500,000 pounds grade C selected spelter, early in the month, which was followed by a fractional advance in quotations, but with the issuance of the preliminary report of the U. S. Geological Survey showing somewhat unfavorable conditions, the advance was almost immediately lost and with no official announcement of the price paid in the Government buying—although reports placed the accepted bids at 8.75 to 9 cents f. o. b. St. Louis—a further recession set in which carried prices to 7.92½ to 8.30 cents New York, and 7.75 to 8.12½ cents East St. Louis by the 27th. Brass special, which had previously been firm at 9 cents, was offered at 8.75 cents. A somewhat firmer tone became evident later, and prices advanced ⅛ cent at the close. Zinc ores were firm at $65 to $75 per ton throughout the month.

LEAD.

The lead industry, in August, suffered not only from the general dullness and inactivity prevailing, but from labor disturbances at the mines as well. A somewhat stronger tone than at the July closing was in evidence early in the month, with average quotations 10.87½ cents New York, and 10.75 cents St. Louis. Reported Government buying for August requirements at 8 cents, with the probability that 8,000 tons will meet monthly needs, was given general credence in the trade, but lacked official confirmation until August 8, when the price was announced at 8 cents per pound without mentioning the specific tonnage. By August 17, offerings were made at ⅛ cent less than quotations, and some sales were made during the next few days. Zinc ore dropped $10 to $100 on August 22, and quotations receded to 10.25 to 10.50 cents on August 28, the net recession for the month being ¼ cent per pound. The "Trust" price was reduced to 10.50 cents per pound New York, August 30.

ANTIMONY.

Antimony in August suffered from the general dullness and uncertainty pervading all metal markets. Sales were small and prices, after advancing from 15 to 15.25 cents for prompt and August at the close of July, to 15.50 cents early in August, were stationary until the middle of the month when a decline set in that carried back to 14.62½ cents by the 31st, for prompt, with September delivery quoted at 14.37½ to 14.87½ cents. At the close, prices were still nominally unchanged and the market was lifeless.

ALUMINUM.

The aluminum market in August was inactive and very dull throughout the entire month. Prices were stationary at 48 to 50 cents for No. 1 virgin remelted; 46 to 48 cents for 98 to 99 per cent remelted, and 36 to 38 cents for No. 12 alloy remelted until August 23, when a decline of 1 cent was noted on all grades. A further recession occurred on August 27, to 46 to 48 cents for No. 1 virgin, 44 to 46 cents for 98 to 99 per cent remelted, and to 34 to 36 cents for No. 12 alloy remelted.

QUICKSILVER.

Final United States Geological Survey statistics for 1916 became available during August and show an output of 29,932 flasks, 75 pounds each, valued at $2,576,547 for the year. This represents an increase in quality of 8,899 flasks and an advance in value of $749,635 compared with 1915 production. During August the price of flasks remained stationary at $115.

SILVER.

The sensational advance in the price of silver, 12⅛ cents per ounce, from 78⅝ cents at the close of July to 90¾ cents August 29th, attracted widespread attention to the unprecedented demand for silver at this time from all over the world and to the increasing scarcity of the metal. At the close the price was 90¾ cents. Today the price is 98⅜ cents.

PLATINUM.

Proposed platinum development in Alaska, with assistance of the United States Government, interested the trade generally during August. Active demand for this metal continues and prices remained unchanged at $105 for pure and $111 for 10 per cent irridium.

OLD METALS.

Old metals trade in August fared better than new metals in most instances, and while consumers were out of the market until after the middle of the month, dealers kept things fairly active and price advances of from ½ to 1 cent were registered on all "brasses," as well as on the various "coppers," block tin pipe and pewter, by August 10. The aluminums were neglected and down 3 to 8 cents at the same time, but rallied slightly before the close. The demand for German silver was an unusual feature in the third week. The demand for other scrap fell off slightly before the close, but prices were practically unchanged.

WATERBURY AVERAGE

The average prices of Lake Copper and Brass Mill Spelter per pound as determined monthly at Waterbury, Conn.:

Lake Copper, 1916—Average for year, 28.77. 1917—January, 32.25. February, 35.25. March, 35.50. April, 32.75. May, 32.00. June, 32.50. July, 30.875. August, 29.00.

Brass Mill Spelter, 1916—Average for year, 17.725. 1917—January, 13.05. February, 13.80. March, 13.45. April, 11.85. May, 11.05. June, 10.85. July, 10.55. August, 10.05.

AUGUST MOVEMENTS IN METALS

COPPER.	Highest.	Lowest.	Average.
Lake	30.00	27.00	28.75
Electrolytic	29.00	25.50	27.13
Casting	28.50	25.00	26.576
TIN	64.00	61.50	62.685
LEAD	11.00	10.50	10.944
SPELTER	8.80	7.92½	8.477
ANTIMONY	15.50	14.50	15.247
ALUMINUM	50.00	46.00	48.478
QUICKSILVER (per flask)	$115.00	$115.00	$115.00
SILVER (cts. per oz.)	90.75	79.00	85.407

Metal Prices, September 10, 1917

NEW METALS.

	Price per lb.
COPPER—DUTY FREE. PLATE, BAR, INGOT AND OLD COPPER. Manufactured 5 per centum.	
Lake, carload lots, nominal	27.50
Electrolytic, carload lots	27.75
Casting, carload lots	25.50
TIN—Duty Free.	
Straits of Malacca, carload lots	61.875
LEAD—Duty Pig, Bars and Old 25%; pipe and sheets.	
20%. Pig lead, carload lots	10.50
SPELTER—Duty 15%.	
Brass Special	8.75
Prime Western, carload lots, nominal	8.175
ALUMINUM—Duty Crude, 2c. per lb. Plates, sheets, bars and rods, 3½ per lb.	
Small lots, f. o. b. factory	54.00
100-lb. f. o. b. factory	51.00
Ton lots, f. o. b. factory	47.00
ANTIMONY—Duty 10%.	
Cookson's, Hallet's or American	Nominal
Chinese, Japanese, Wah Chang WCC, brand spot	14.625
NICKEL—Duty Ingot, 10%. Sheet, strip and wire 20% ad valorem.	
Shot or Ingots	50 and 55c.
ELECTROLYTIC—5 cents per pound extra.	
MANGANESE METAL	Nominal
MAGNESIUM METAL—Duty 25% ad valorem (100 lb. lots)	$2.25
BISMUTH—Duty free	$3.00
CADMIUM—Duty free	nominal $1.75
CHROMIUM METAL—Duty free	.75
COBALT—97% pure	$2.70
QUICKSILVER—Duty, 10% per flask of 75 pounds	$115.00
PLATINUM—Duty free, per ounce	$105.00
SILVER—Government assay—Duty free, per ounce	$1.03
GOLD—Duty free, per ounce	$20.67

INGOT METALS.

	Price per lb.
Silicon Copper, 10% according to quantity	53 to54
Silicon Copper, 20% " "	55 to60
Silicon Copper, 30% guaranteed. " "	60 to65
Phosphor Copper, guaranteed 15% " "	75¾to77¼
Phosphor Copper, guaranteed 10% " "	74¼to75⅜
Manganese Copper, 30%, 2% Iron " "	80 to85
Phosphor Tin, guaranteed 5% " "	81 to83
Phosphor Tin, no guarantee " "	75 to80
Brass Ingot, Yellow " "	20 to22
Brass Ingot, Red " "	25 to28
Bronze Ingot " "	25 to28
Parsons Manganese Bronze Ingots " "	33½to35
Manganese Bronze Castings " "	39 to48
Manganese Bronze Ingots " "	25 to31
Phosphor Bronze " "	34 to36
Casting Aluminum Alloys " "	45 to47

OLD METALS.

Dealers' Buying Prices.	Dealers' Selling Prices.
24.00 to 24.50 Heavy Cut Copper	25.00 to 26.00
23.00 to 24.00 Copper Wire	25.00 to 26.00
21.00 to 22.00 Light Copper	23.00 to 24.00
21.00 to 22.00 Heavy Mach. Comp	24.00 to 25.00
16.00 to 16.50 Heavy Brass	17.50 to 20.00
12.50 to 13.50 Light Brass	14.50 to 17.00
16.00 to 16.50 No. 1 Yellow Brass Turning	17.50 to 18.50
19.00 to 20.00 No. 1 Comp. Turnings	18.50 to 20.00
8.50 to 9.00 Heavy Lead	9.25 to 9.50
6.50 to 7.00 Zinc Scrap	7.50 to 8.00
23.00 to 23.50 Scrap Aluminum Turnings	25.00 to 25.50
33.00 to 34.00 Scrap Aluminum, cast alloyed	36.00 to 37.00
49.00 to 50.00 Scrap Aluminum, sheet (new)	52.00 to 53.00
39.00 to 40.00 No. 1 Pewter	45.00 to 48.00
30.00 to 32.00 Old Nickel	34.00 to 36.00
23.00 to 25.00 Old Nickel anodes	26.00 to 27.00

PRICES OF SHEET COPPER.

Mill shipments (hot rolled) ..... 36c. base net
From stock ..... 38c. base net

Width.	LENGTH.	64 oz. and over.	32 oz. to 64 oz.	24 oz. up to 32 oz.	16 oz. up to 24 oz.	15 oz.	14 oz.	13 oz.	12 oz.	11 oz.
		Extras in Cents per Pound for Sizes and Weights Other than Base.								
Not wider than 30 ins.	Not longer than 72 inches.	Base	Base	Base	Base	½	1	1½	2	2½
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	½	1	2	3	4½
	Longer than 96 inches. Not longer than 120 inches.	"	"	½	1	2	3	5	7	
	Longer than 120 ins.	"	"	1	1½					
Wider than 30 ins., but not wider than 36 inches.	Not longer than 72 inches.	"	"	Base	Base	1	2	3	4	6
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	1	2	4	6	8
	Longer than 96 inches. Not longer than 120 inches.	"	"	1	2	3	4			
	Longer than 120 inches.	"	1	2	3					
Wider than 36 ins., but not wider than 48 inches.	Not longer than 72 inches.	"	Base	1	2	3	4	6	8	9
	Longer than 72 inches. Not longer than 96 inches.	"	"	1	3	4	5	7	9	
	Longer than 96 inches. Not longer than 120 inches.	"	"	2	4	6	9			
	Longer than 120 inches.	"	1	3	6					
Wider than 48 ins., but not wider than 60 inches.	Not longer than 72 inches.	"	Base	1	3	5	7	9	11	
	Longer than 72 inches. Not longer than 96 inches.	"	"	2	4	7	10			
	Longer than 96 inches. Not longer than 120 inches.	"	1	3	6					
	Longer than 120 inches.	1	2	4	8					
Wider than 60 ins., but not wider than 72 ins.	Not longer than 96 inches.	Base	1	3	8					
	Longer than 96 inches. Not longer than 120 inches.	"	2	5	10					
	Longer than 120 inches.	1	3	8						
Wider than 72 ins., but not wider than 108 ins.	Not longer than 96 inches.	1	3	6						
	Longer than 96 inches. Not longer than 120 inches.	2	4	7						
	Not longer than 120 inches.	3	5	9						
Wider than 108 ins., but not wider than 120 ins.	Not longer than 120 inches.	4	6							

The longest dimension in any sheet shall be considered as its length.

CIRCLES, 8 IN. DIAMETER AND LARGER, SEGMENTS AND PATTERN SHEETS, advance per pound over prices of Sheet Copper required to cut them from ..... 8c.

CIRCLES LESS THAN 8 IN. DIAMETER, advance per pound over prices of Sheet Copper required to cut them from ..... 8c.

COLD OR HARD ROLLED COPPER, 14 oz. per square foot and heavier, advance per pound over foregoing prices ..... 1c.

COLD OR HARD ROLLED COPPER, lighter than 14 oz. per square foot, advance per pound over foregoing prices ..... 2c.

COLD ROLLED ANNEALED COPPER, the same price as Cold Rolled Copper.

ALL POLISHED COPPER, 20 in. wide and under, advance per square foot over the price of Cold Rolled Copper ..... 1c.

ALL POLISHED COPPER, over 20 in. wide, advance per square foot over the price of Cold Rolled Copper ..... 2c.

For Polishing both sides, double the above price.

The Polishing extra for Circles and Segments to be charged on the full size of the sheet from which they are cut.

COLD ROLLED COPPER, prepared suitable for polishing, same prices and extras as Polished Copper.

ALL PLANISHED COPPER, advance per square foot over the prices for Polished Copper ..... 1c.

Metal Prices, September 10, 1917

PRICES ON BRASS MATERIAL—MILL SHIPMENTS.

In effect September 1, 1917.

To customers who buy over 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.34¼	$0.37	$0.39¾
Wire	.34¼	.37	.39¾
Rod	.32½	.37¾	.40¾
Brazed tubing	.41½	——	.47¼
Open seam tubing	.41½	——	.47¼
Angles and channels	.41½	——	.47¼

To customers who buy over 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.36¼	$0.39	$0.41¾
Wire	.36¼	.39	.41¾
Rod	.34¼	.39¾	.42¾
Brazed tubing	.43½	——	.49¼
Open seam tubing	.43½	——	.49¼
Angles and channels	.43½	——	.49¼

[Note.—Net extras for quality for both sections of above metal prices are not quoted due to the fluctuations in the price of zinc.—Ed.]

BARE COPPER WIRE—CARLOAD LOTS.

30c. per lb. base.

SOLDERING COPPERS.

300 lbs. and over in one order.....42½c. per lb. base
100 lbs. to 300 lbs. in one order.....43½c. " " "
Less than 100 lbs. in one oredr.....45c. " " "

PRICES FOR SEAMLESS BRASS AND COPPER TUBING.

From 1¼ to 3½ O. D. Nos. 4 to 13 Stubs' Gauge, — per lb.
Seamless Copper Tubing, — per lb.

For other sizes see Manufacturers' List.

Due to fluctuations of the metal market we are unable to quote these prices.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron pipe sizes with price per pound.

⅛ ¼ ⅜ ½ ¾ 1 1¼ 1½ 2 2½ 3 3½ 4 4½ 5

Due to fluctuations of the metal market we are unable to quote these prices.

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

Due to fluctuations of the metal market we are unable to quote these prices.

PRICES FOR TOBIN BRONZE AND MUNTZ METAL.

Tobin Bronze Rod.....37½c. net base
Muntz or Yellow Metal Sheathing (14" x 48").....34c. " "
Muntz or Yellow Metal Rectangular sheets other than sheathing.37c. " "
Muntz or Yellow Metal Rod.....34c. " "

Above are for 100 lbs. or more in one order.

PLATERS' METALS.

Platers' bar in the rough, 65c. net.

German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturer.

PRICES OF NICKEL ANODES.

85 to 87% purity ..... 50c. per lb.
90 to 92% " ..... 52½c. " "
95 to 97% " ..... 55c. " "

PRICE SHEET FOR SHEET ALUMINUM—B. & S. Gauge.

Base price, 60c.

We are unable to quote these prices, but they can be had upon application to manufacturers and dealers.

PRICE LIST SEAMLESS ALUMINUM TUBING.

We are unable to quote these prices, but they can be had on application to manufacturers and dealers.

PRICE LIST FOR ALUMINUM ROD AND WIRE.

We are unable to quote these prices.

PRICES OF SHEET ZINC.

Duty, sheet, 15%.

	Cents per lb.
Carload lots, standard sizes and gauges, at mill	19 cent basis, less 8%
Casks, jobbers' prices	21.00
Open casks, jobbers' prices	21.50

BASE PRICE GRADE "B" GERMAN SILVER SHEET METAL.

Quality.	Net per lb.	Quality.	Net per lb.
5%	45½c.	16%	50c.
8%	46½c.	18%	50½c.
10%	46¾c.	20%	52¼c.
12%	48½c.	25%	60c.
15%	49c.	30%	65½c.

GERMAN SILVER WIRE.

Quality.	Net per lb.	Quality.	Net per lb
5%	47c.	15%	55c.
8%	48c.	16%	55½c.
10%	51c.	18%	57½c.
12%	53c.	30%	73c.

The above Base Prices are subject to additions for extras as per list printed in Brass Manufacturers' Price List and from such extras 50% discount will be allowed. The above base prices and discounts are named only to wholesale buyers who purchase in good quantities. Prices on small lots are considerably higher.

PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Sheet Block Tin—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more 5c. over Pig Tin. 50 to 100 lbs. 6c. over, 25 to 50 lbs. 8c. over, less than 25 lbs. 10c. over.

No. 1 Britannia—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more 3c. over Pig Tin. 50 to 100 lbs. 4c. over, 25 to 50 lbs. 5c. over, less than 25 lbs. 10c. over.

Above prices f. o. b. mill.

Prices on wider or thinner metal on request.

PRICES OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quantity and market conditions. No fixed quotations can be given, as prices range from 1c. below to — above the price of bullion.

Rolled silver anodes .999 fine are quoted at ——— above the price of bullion. Manufacturers state that as silver is selling at a premium at the present time they are unable to give any quotation.

PRICES OF SOME METAL INDUSTRY CHEMICALS AND MATERIALS.

Phosphorus—Duty free, according to quality	Nominal.
Nickel Salts, Single bbl	14c. per lb.
Nickel Salts, Double bbl	11c. " "
Sodium Cyanide	37c. " "
Silver Nitrate, 100 oz. lots	61½c. per oz.
Sodium Carbonate (Sal Soda)	.05c. per lb.

Prices for Cotton Buffs.

Open buffs per 100 sections (nominal).

12 inch,	20 ply,	64/68,	cloth		base	$40.00
14 "	20 "	64/68,	"		"	52.50
12 "	20 "	84/92,	"		"	47.55
14 "	20 "	84/92,	"		"	61.70

Sewed buffs per pound.

Bleached and unbleached	base 34c.
Colored	" 31c